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Pursuing Development with Educational Technology Standards: Complicating Narratives of ICTs in the Classroom

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Pursuing Development with Educational Technology Standards: Complicating Narratives of ICTs in the Classroom

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For Dashiell, Diego, and teachers committed to social change.

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Pursuing Development with Educational Technology Standards: Complicating Narratives of ICTs in the Classroom

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This dissertation examines stakeholder narratives that surround Information Communication Technologies (ICTs) in education, as well as the gap that exists between this narrative and effective widespread integration of ICTs in the classroom. Popular narratives surrounding ICTs in education often position ICTs as positive and inevitable and as a development strategy that benefits individuals, nations, and the global marketplace. However, ICTs are not equally distributed or enjoyed within or among nations. Technologies, information, and social development efforts are not neutral but are socially constructed and motivated by specific actors trying to achieve certain outcomes. This research, anchored in theories of ICTs in education, globalization, development communication, digital divide, and production of culture, provides a critical perspective to better understand who contributes to the production of the education technology culture and what social development gains are possible through the implementation of such efforts.

One major factor contributing to the narrative of ICTs in education is the widespread adoption of education technology standards. This case study examines the stakeholder culture that produces those standards and contributes to the education technology narratives. Through interview and historical organization document analysis, I examine the processes followed to establish the National Education Technology Standards (NETS); the stakeholders that contribute to and operate within a culture of instructional technology that informs the development of technology standards; and how the production of culture surrounding instructional technology standards has been realized internationally.

I argue that there is a disconnect between the production of instructional technology culture and the realities facing poor schools and poor nations. Despite the development and widespread adoption of educational technology standards, significant educational gains have largely gone unrealized. While I do not dispute the importance of establishing a minimum set of expectations for ICTs in education, I assert that the focus on standards distracts from more challenging conversations concerning inequities among schools and the deep socioeconomic divisions that continue to reinforce the digital divide and the overall inability to provide equitable opportunities for students.

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Chapter One: Introduction

In addition to being tasked with integrating Information and Communication Technologies (ICTs) in the classroom, teachers are being called on by government, school boards, and district administrators to change their methods of instruction, to modify their role in the classroom, and to improve learning outcomes based on standard accountability measures and testing. As demands on teachers continue to grow and as greater accountability measures are put into place to evaluate teachers' success in helping students learn, we must become more critical about how ICT integration is understood in the classroom. We must evaluate how ICTs are promoted and used and how success is measured, but more importantly, we must identify where the disconnect lies between what stakeholders believe is important about ICTs and the resistance to the use of ICTs in the classroom (Selwyn, 2002; Gill & Dalgarno, 2008). This research explores the expectations that surround ICTs and what is deemed important about them, specifically through the creation and adoption of instructional technology standards. It also explores the gap between how ICTs have been prioritized and by which stakeholders and why, despite this prioritization, effective widespread classroom integration has not yet been realized.

Over the past fifteen years working as a professional in the field and as a scholar studying technology in education, I have witnessed some amazing innovations as well as a lot of wasted time and money. Many school and district leaders have invested effort and funding into trying to integrate an infrastructure that supports ICTs and teachers' use of them. Some efforts have been successful, but many more have not. In countless site visits to campuses, I have found new laptops stacked in unopened boxes in the corner of an IT room and email systems unused by teachers despite the technology coordinator's efforts to encourage and train teachers of their value. Administrators feel the pressure to improve their ICT integration in their campuses and classrooms; some approach the integration in a planned and systematic way, working with teachers collaboratively to discover technology's value and to find ways to use these resources to improve and enhance classroom instruction. Others, however, see ICT funding sources as a way to get equipment or professional development training for their teachers but because they do not realize the potential or purpose of ICTs, equipment goes unused or underused (Cuban, 2001). Worse, the hardware breaks down or the Internet connectivity is too slow or does not have enough support to keep it going, so teachers don't invest the time trying to figure it out. As a result, ICTs become more of a hassle than a benefit in the classroom (Bingimlas, 2009). Instead of facilitating the progressive change promised by proponents of educational technology to improve teaching and learning, school classrooms remain grounded in traditional modes of instruction that are increasingly failing to foster student success (Council on Foreign Relations, 2012). In addition to a lack of ICT integration, schools are struggling with the value of standardized student testing and the increasing failure of public schools to graduate students with the knowledge and skills required to compete for jobs and to participate in society effectively (Lippman, 2008).

Public education is critical to the health of a nation. It is one of the only institutions that can bind a country together by establishing a common experience for students in understanding foundational knowledge of core subjects. This common experience can lead to a rewarding life and career; can encourage participation in democratic society; and can teach people how to learn and communicate ideas. Over the past 30 years, ICTs have become a major part of the educational narrative, especially as they relate to fixing an ailing system and preparing students for modern challenges. It is believed that ICTs can enhance education by providing faster and up-to-date information, facilitate instant communication in a variety of formats, and make learning more engaging for students by allowing them to seek out, process, and communicate ideas in new ways. ICTs provide great value to various sectors of society by creating greater efficiencies, new economies, better communication, better organization and communication of data, and much more. In the education sector, however, adoption of technology for instruction has been slow. This lack of widespread adoption of ICTs in education occurs despite the concerted efforts of a variety of government, private, and public stakeholders. Government and private industry have contributed funding and grant opportunities, myriad reports about the need for and benefits of technology have been released, and warnings have been issued about the effect that lack of adoption has on the welfare of the nation state. Likewise, many national and international associations and task forces have released calls of alarm describing how lack of ICT integration in classroom instruction denies students the skills necessary to live and work in the twenty-first century–ultimately putting nations at a competitive disadvantage in the global marketplace.

Despite a popular discourse that recognizes that ICTs are important to schools and to national economic health, integration is largely unrealized at the classroom level. ICTs have become normalized as a necessary part of education reform in narrative produced by government education departments, advocacy groups, curriculum associations, private businesses, and nonprofits alike. Understanding the evolution of ICTs in education and the stakeholders involved in establishing standards around technology in education has national and international implications related to funding, education policy, and teacher and student evaluation measures. Developing a deeper understanding for how these expectations have evolved and by which stakeholder groups can shed light on key issues facing education.

Education systems internationally face similar challenges. Internationalization of education and instructional technology standards is commonplace. Common transnational corporate funding sources and international government and nongovernmental initiatives create a narrative of common national expectations, especially as they relate to workplace readiness and competitiveness. By critically examining national initiatives to facilitate ICTs in education, we gain more insight into international congruencies emerging between education, ICTs, and the marketplace. Gaining insight into how standardizing ICTs in education is benefiting stakeholders internationally is thus equally important to learning how those outside of decision-making circles are not realizing benefits of such technology whether in theory or practice.

Most people would agree that technological advances have brought many benefits to society, and that many things we take for granted today were unfathomable just ten years ago. As a privileged middle-class citizen of the United States, I find myself enthralled by the evolving wonders—and expenses—of technology for personal, professional, and educational purposes. I have a television with direct Internet connection that can access countless films and television series. I have an iPod that allows me to access limitless types and amounts of music and remote storage clouds that house as much information as I want, relatively inexpensively. I have high-speed Internet access that allows me to communicate, through video and email, with friends and family all over the world, at any time, for close to no cost. This connectivity also allows me to access academic research, to collaborate with University colleagues, to research volunteer opportunities, to read the latest news updates, to share my opinion on local and online businesses and politicians, and to find out what is happening in my community. Having access to a high-speed Internet service allows me to work remotely with individuals and teams from across the globe to design digital educational resources for higher education, using file sharing, web presentations, instant chat messaging, collaborative document creation, email, and mobile devices. In my personal and academic life—and the lives of many others like myself—there is no doubt that technology has brought many advantages. The strategic development of technology, along with institutional and international economic structures, has facilitated new types of work and labor requirements. For elites working in the transnational networks of global cities around the world (Sassen, 2001) or as part of the mega-metropolitan nodes in an international networked society (Castells, 2011), participating in the modern economy through the use of technology is a benefit. However, for the majority of others who reside outside the networked society, economic and educational marginalization continues to increase. The International Telecommunication Union (ITU) (2011) report that of the world's seven billion people only one third of households have Internet access. Disparities by global region are enormous. The same report compares those with bandwidth access for the average user in Europe at close to 90,000 bits/second versus 2,000 bits/second per user in Africa, and in poorer countries Internet access is often only accessible via mobile devices. Cost, speed and hardware restrictions severely limit what the user can access and do online. In the United States, according to a recent Pew Research Center report (2012), 66% of homes have high-speed broadband connection and one in five American adults do not access the Internet. The breadth and benefits of the rapid technological evolution has not been equally distributed or enjoyed within or among nations. Despite an ever present digital divide that falls largely along socio-economic lines, popular discourse says that equitable technological infrastructure has been realized. In contrast to the popular media, education statistics nationally and internationally paint a different and less optimistic picture.

This research is oriented towards a U.S.-centric perspective towards the digital divide and as such shows that student and educational success, like the integration of ICTs in communities and schools, largely aligns with the socio-economic divide. This educational division continues despite the popular narrative that recognizes that education and ICTS are both critical to national and international social and economic success. The education sector is often seen as a social resource intended to create opportunity for citizens socially, economically, and culturally. Especially given the limitations of broadband accessibility in the home, both in the United States and internationally, having access to technology and high-speed Internet connectivity in schools and developing the skills and opportunity to engage with that technology is critical to participation in the global, networked society. However, like the communities that surround them, schools are plagued with socio-economic problems that impact access to quality ICTs, ongoing technical support to keep systems running, and meaningful application of ICT resources for learning and teaching. The discourse surrounding technology in education is that more technology is better and that, with the right training for teachers, technology can be used effectively and education will be improved to meet the needs of twenty-first century learners. Even though the technology infrastructure and utilization in schools is not equally distributed, a common narrative has been widely adopted in all states in the United States and internationally—the creation and adoption of educational technology standards.

The international narrative surrounding education technology is that technology is required for living and working in the twenty-first century, that integrating technology effectively into classroom instruction is necessary to prepare students for competing in the global economy, and that technology access is largely ubiquitous.[1] These assumptions have become woven into political, educational, and business narratives; most people

[1] Examples of this narrative include, accessed September, 2011:
http://www.p21.org/storage/documents/p21setdaistepaper.pdf;
http://www.ets.org/Media/Tests/Information_and_Communication_Technology_Literacy/ictreport.pdf;
http://www.ed.gov/sites/default/files/NETP-2010-final-report.pdf;
http://www.ccsso.org/Documents/2009/Transforming_Education_Delivering_2009.pdf;
http://www.itif.org/files/Education_ITIF.pdf; http://www.siia.net./visionk20/;
http://www.mckinsey.com/locations/southeastasia/knowledge/Education_Roundtable.pdf;

recognize that not prioritizing technology in national development—especially in education and commerce—places nations at a great disadvantage. In just a matter of several decades, societies internationally have accepted the need for technology to make their education systems or programs succeed. This need is demonstrated by efforts such as the World Summit on the Information Society, the development of UNESCO ICT competency framework for teachers and students, and the ongoing international efforts to implement programs providing one laptop per child. At a time when communities and nations face incredible economic hardships, many look to education and technology to find solutions to society's most pressing challenges and prioritize these efforts for the sake of social development. Investigating the effectiveness of such efforts to integrate ICTs in education is critical, especially because much-needed funding sources for education are becoming scarcer.

Instead of assuming that ICTs are beneficial to education, as popular narrative dictates, we must investigate how we, as an international society, have arrived at the place where we expect and require technology access, skills, and personal/professional applications of technology to succeed. How did we create this expectation and need for technology in education internationally? What implications do these expectations ultimately have on improving success in the classroom?

The drive for better technological connectivity and infrastructure, and for more and better citizen usage of technology is a priority for national governments, individuals, social and educational institutions, and international governing and non-profit bodies—and for good reason. The economic, social, political, and educational drivers for this appear to be clear. However, the needs and expectations of technological benefits are not the same for everyone within any given country or among various countries. Accessibility and infrastructure are not the same, and participation is not equal. Even so, since the 1980s when national reports such as “A Nation at Risk,” released in 1983, sparked interest in global competitiveness, emphasis on policy, funding, training, and innovation in educational technology has grown among governing bodies, corporations, and advocacy groups. As a result, a kind of frenzy occurs in the education sector, where funding for ICT initiatives is sought without a well-founded or established plan and without the buy-in of the teachers who must implement these initiatives to realize success. Schools focus on obtaining technology for student instruction, for teachers’ professional development, for standardized testing, for facilitating communications, for offering online tutoring and courses, and for countless other hardware and software applications. These technology acquisitions are often isolated events that occur as a result of a funding opportunity or a short-lived administrative or government leadership initiative. Calls for increased integration of ICT tools and resources are justified from an administrative point of view because they can improve efficiencies and provide greater accountability by making more information more easily accessible, more cheaply. ICT tools and resources can also facilitate new ways of learning, communicating, participating locally or globally, and fostering greater personal expression. All of these improvements should ultimately lead to a more informed citizenry, a greater competitive edge in the global economic market, and overall better living standards. However, there is little critical examination of the popular assumptions underlying the spread of and reliance on technology in education. Even more surprisingly, there has been little critical evaluation of what ineffective integration of ICT programs means for progressive change in education.

Because technologies, information, and social development efforts are not neutral endeavors, but are socially constructed and motivated by specific actors trying to achieve certain outcomes, I believe that it is important to gain a more critical understanding of who produces and controls these endeavors, who these endeavors are intended to serve, and ultimately what social development gains are to be had by the implementation of these endeavors. A variety of stakeholders who believe in the value of ICTs in education have worked to create a set of expectations and assumptions about why technology benefits educators and how it should be implemented. These expectations and narrative frameworks for looking at technology and education influence how funding is funneled; what types of funding are made available and to which entities; what types of professional development training is provided; what is expected of students, teachers, and parents; and how education is ultimately shaped by technological progress. Government and corporate entities, along with technology advocacy groups and international agencies, have worked together to establish a common discourse surrounding ICTs in education that addresses the problem of global competitiveness and national and global economic development. This discourse about ICTs, education, and international competitiveness creates an expectation that normalizes the relationship between public and private entities—and this expectation assumes the social benefit of ICTs without examining the impetus and effects of such stakeholder influence.

This case study research of the non-profit organization, the International Society for Technology in Education (ISTE), complicates some of the normalized narrative frameworks that have been established by stakeholders promoting ICTs for education and that have become broadly accepted as necessary and accepted solutions. The application of theoretical perspectives related to the digital divide, education, and ICTs; development communication; and the production of culture inform my research study and help identify important gaps in knowledge that prevent us from reaching the ultimate objective of improving the largest number of lives through education by deliberately implementing ICTs.

The first broad research question that drives this study is, "What factors contribute to the creation of expectations, via standards, of technology in education?" The intermediary research questions necessary to examine this broader question are:

1. How has the International Society for Technology in Education (ISTE) established technology standards for education?
    a. What process has ISTE followed to establish technology standards?
    b. What has impacted change in standards since the initial standards were established?
    c. Which industry, government, and individual actors have contributed to the establishment of ISTE technology standards and in what ways?

2. In what ways have technology standards and expectations of technology in education been facilitated by ISTE internationally?

The second key broad research question of this study is, "In what ways has institutional discourse of ICTs in formal education changed over time?" This question is investigated with the following intermediary question: "How has ISTE's discourse, related to ICTs in education, been framed since its founding in 1979?"

To examine these two key questions, I conducted case study research to examine a non-profit organization, the International Society for Technology in Education (ISTE), which has established the widely adopted national and international education technology standards for students, teachers, and administrators. ISTE is a membership-based organization that provides professional development training and member resources and services; it participates in political advocacy for education technology and ICT funding. ISTE's membership consists of national and international affiliate groups that maintain their own membership base, instructional technology coordinators, educators, administrators, private industry, and national and international government agencies whose mission is to "advance excellence in learning and teaching through innovative and effective uses of technology."[2]

ISTE serves as an ideal case study to examine not only how the framing of technology in education has changed over time, but to examine the actors that have played a role in the shaping of expectations and standards of technology in education. Through interviews and content analysis, I examine the processes ISTE follows to establish technology standards; examine the stakeholders that produce and operate within a culture of instructional technology that informs the development and evolving conceptualization of technology standards; and, how the production of culture around instructional technology standards has been realized internationally.

[2] ISTE mission statement accessed via the ISTE website, June, 12, 2012: http://www.iste.org/about-iste/governance/strategic-plan.aspx

Evaluating my research questions through the lens of an ISTE case study provides insight into how expectations for technology in education have evolved and which actors have played a role in their creation. By exploring key issues of technology and education, through the lens of theoretical perspectives related to the digital divide and development communication, I analyze both the benefits and the deficiencies of implementing ICTs in education and explore ways to improve equitable educational outcomes. This critical analysis examines the benefits of using ICTs in education and also recognizes that the reality of effective integration and the outcomes and objectives for ICT integration in education is far from equal.

The organization of this research begins with an examination of literature relevant to this study in chapter two, which includes: Information and Communication Technology (ICT) in education, globalization, the digital divide, development communication, and production of culture. Chapter three outlines the research methodology including examination of the questions driving the study, instruments and methods of data collection and data analysis used, and study limitations. Chapter four contains the research analysis outlined in five sections: Producing a culture of educational technology; Developing national education technology standards; Internationalizing educational technology standards; Framing discourse of ICTs in education from 1979-2011; and discussion. Chapter five contains the conclusion.

Chapter Two: Literature Review

This section examines literature key to the analysis of this research. In the first section of this literature review, I consider literature about Information and Communication Technology (ICT) in education and stakeholder groups interested in realizing the integration of such tools. Business, government, education, and nonprofit sectors all contribute to a narrative that defines the role of ICTs in education, the importance attributed to such tools in fostering success in teaching and learning, and contributing to education reform that prepares students for the new realities of living and working in an information age. Living in an *information age*, a *digital world*, a *global and digital society*, or an era of *digital-age learning* all relate to the rise in use of ICTs to produce, process, store, and distribute information across cultural, social, and economic sectors. With the rise in ICTs have come new jobs, new ways of doing existing jobs, and new ways of communicating and learning. This information age differs from previous societal structures based on agriculture and manufacturing. The conceptualization of the information age has implications for the education sector. Stakeholders have produced a narrative surrounding instructional technology culture that contributes to a widely accepted notion of the role, purpose, and importance of ICTs in education at the individual, national, and international levels. Many perspectives motivate stakeholder narratives surrounding the implementation of ICTs in education. I will explore these perspectives related to the benefits, barriers, and beneficiaries of ICTs in education, including an examination of the state of the digital divide, in the context of the United States, and equitable access to ICTs in education. The stakeholder narratives surrounding the rationale, benefits, and drawbacks of ICTs in education is an international one, facilitated by the globalization of business, communications, education, and development.

The second section of this literature review investigates the globalization of ICTs in education and the growing effort to develop a common narrative through adoption of international standards for instructional technology. ICTs have increased the ease, speed, and benefit of international business and provided greater opportunities for educational exchange, collaboration and communication. It is often argued that ICTs have increased efficiency, productivity, and effectiveness in the business, government, and health sectors but that education has not achieved such successes. As key sectors of society continue to be woven into an international economic, social, and political web, new education and workforce training is required for students to be successful participants in society, school, and in the international workplace. Unless ICTs are effectively integrated into schools, students are placed at a disadvantage in a competitive twenty-first century- information age. This connection between ICTs, education, and economic and social success is a common narrative internationally. The inevitability, necessity, and benefit of ICTs in education have been *naturalized* through the production of an instructional technology cultural narrative. This narrative has increased the focus on national and international development efforts to integrate ICTs in education. Although ICTs can and do contribute many benefits for learning and teaching, there are also several key concerns that must be considered ; these concerns are often overlooked or overshadowed by the instructional technology narratives that promote the positive and inevitable nature of ICTs.

The final section of this literature review examines globalization and development communication scholarship, which helps to contextualize economic, political, and social forces that contribute to globalization of ICT development efforts in education. Understanding the role of power in the production of instructional technology culture, and how these forces relate to issues of the digital divide can help restructure the narrative and refocus the goal of development efforts of ICTs in education. Given that teaching and learning through the effective integration of technology in education is the goal, and that the key driver behind the ultimate success of this development effort is teachers, more effective effort must be made to address basic key barriers preventing integration from occurring; infrastructure, ongoing tech support, and broad teacher engagement in contributing to the instructional technology culture. The production of instructional technology culture is deliberate; it is constructed, and controlled by stakeholders that care about this issue and that have the power and motivation to contribute to this narrative. When the narrative becomes naturalized, it can be at the expense of those whom the initiatives behind the narrative are intended to serve. Researching the evolution of ICTs in education and the internationalization of instructional technology standards through the lens of these theories can help focus and reshape the narrative and the efforts surrounding the production of instructional technology culture to emphasize support of the key beneficiaries of education, the teachers and students.

ICTs in Education: Benefits, Beneficiaries, and Barriers

Education is often at the heart of policy debates in the United States at the federal, state and local levels. Strong opinions flare over key issues facing education — especially with relationship to funding, curriculum, course content, student demographics, teacher salaries, and standardized testing. These issues are frequently addressed in news stories and affect every citizen in the country directly or indirectly through policy decisions and social outcomes. All citizens contribute financially to local education systems through their tax contributions. Additionally, citizens benefit from having a well-educated workforce and an informed citizenry; for those with children, school success is key to their children's academic and professional future. There are many success stories surrounding public education in the United States and there are an equal number of challenges.

Most people see education as an important and valued social institution that provides equal opportunity for all citizens to acquire knowledge and skills to participate effectively in a democracy and to contribute to society and the economy by engaging in meaningful employment. In the United States, state and local governments are responsible for providing public education opportunities. There is no national curriculum or national exam, for example, nor does the federal government have the ability to influence districts or schools outside of enforcing civil rights laws to provide equal quality education to all students regardless of sex, race, income, gender, or ability. The federal government requires compensatory education and that states enact accountability and testing measures to ensure education quality. Because of the decentralized nature of

U.S. public education, states control most other aspects of education administration such as setting graduation requirements, hiring and credentialing teachers, setting assessment and content standards, making curriculum decisions, setting funding levels, and putting processes in place for teacher compensation, facility management, and school financing. As a result of this decentralization, consistency of any kind across the education system is impossible. The main avenue for federal influence is through the dispersal of federal grants, provided to states, which must then comply with federal standards and rules associated with the funded effort. Recent debates rage over state control of standardized testing and a common core of curriculum as the federal government and other school leaders try to instigate major school reform to address the national and international shortfalls of the current system.

Popular press, educators, scholars, parents, and business leaders argue that the current public education system is broken because it is not providing students with knowledge and skills necessary to effectively participate in society or the workforce and because it is not serving business and the economy by producing enough skilled citizens. The Harvard Graduate School of Business released a report, *Pathways to Prosperity,* in 2011 that examines some of these issues. The report notes that U.S. employers cannot find high school graduates equipped with the skills and knowledge necessary to fill open positions, which is ultimately hurting our students and their families as well as compromising our national economic global competitiveness. The report shows that the United States has fallen from 1st place to 13th compared to other countries in the number of high school students it currently graduates. Scholars are also investigating various aspects of the failure of public schools to prepare students adequately for contemporary college and career demands. For example, Goldin & Lawrence (2008) explore the shortfall of education by examining the relationship between public investments in education and the role of innovations in technologies, while Wurdinger (2012) is concerned with the negative effects of standardized testing on student success. Leiding (2012) specifically addresses the failure of public schools to provide culturally- diverse students with an adequate education to lead students (many of whom experience deep seated poverty and racism) with an adequate education to lead them to success in high school, college, and careers.

The Partnership for 21st Century Skills (P21) — which is comprised of organizations and corporations such as the National Education Association, the Walt Disney Company, Pearson, Cisco, Adobe, Intel, and the American Association of School Librarians — is also concerned about high school dropouts but even more so the lack of student preparedness of those who do graduate from high school. The P21 coalition and many others like it are focused on identifying the skills and knowledge required for work and life in today's world. They argue that schools are not preparing students with the knowledge and skills they need to succeed such as high-quality oral and written communication skills, the ability to think critically, a sense of professionalism, effective problem solving, and creativity. They blame this lack of skill and knowledge on limiting and outdated classroom instruction— meaning that classroom instruction focuses on the traditional classroom lecture environment as opposed to a more project-based, collaborative, problem-solving approach that engages students in the learning process and requires them to apply knowledge in contextualized, real-life situations. Similar reports and news stories abhorring the state of education related to these issues are prevalent, and education reform is being demanded by all sectors of society, from business, to education, to parent groups, and government.

Concurrent with the P21 coalition and others' call (Bellanca & Brandt, 2010) for twenty-first century education reform in terms of skill development and greater contextualization and application of learned materials, Harvard's Graduate School of Education *Pathways to Prosperity* (2011) report also notes additional troubling outcomes that result from the traditional classroom structure, especially for post-adolescent students. For example, the report states that the school system is doing a major disservice to students by not engaging them in meaningful and contextual learning environments that make a connection between the value of school and its relationship to employability and making a living wage. Students drop out of school for a number of reasons including lack of perceived value or personal benefit of education or because of family and economic responsibilities. The report notes that low-income teens are put at the greatest disadvantage of not being supported by the education system because they are the ones that rely on the system not only for knowledge and skill building but also for providing the social and cultural capital necessary to recognize characteristics of what a good job is, what they need to know and do in order to get work that best suits them, and how to apply knowledge and skills to real contexts. The report argues that schools need to be reformed to help all students succeed by providing more engaging and contextualized learning environments that lead to greater post-secondary and employment opportunities, noting that traditional classrooms are not doing the job. With the most recent recession, for example, low-income teens have been hit hardest, as reflected in the subsequent result of the highest level of unemployment among this age group.

> …the percentage of teens (16-19) who were employed fell from 45.2 percent in 2000 to just 28.6 percent in June 2010…this catastrophe has hit low-income minority teens especially hard, even though they are the very youth who are most likely to struggle in school and who most need the supports that employment provides. Incredibly, just 9 percent of low-income black teens are employed, as are just 15 percent of low-income Hispanic teens. In sharp contrast, the employment rate among upper middle-income white teens (whose families earn $75,000 to $100,000 a year) is 41%— four times higher than among low-income black teens (p. 4).

The report analyzes the relationship between the current school system and this lack of success amongst socio-economic divisions in schools. Inequity in schools is growing; without major reforms, students who come from families without the ability to provide financial, social, or cultural support to their children to obtain post-secondary education or employment are set at a great disadvantage whether or not they graduate or dropout from school.

> The problem is that as income inequality has widened, this has created a terribly uneven playing field. Children of affluent parents tend to do well…They are eight times more likely to earn college degrees than their low-income counterparts, and the financial support provided by their parents gives them enviable freedom to make the transition to adulthood in comfort. In stark contrast, middle class parents struggle to provide even a fraction of the same support. Their children are often forced to juggle college with work and take out huge student loans. Meanwhile, young adults from low-income families receive little financial or critical social-network resources that would help them make a successful transition…Ultimately, millions of young adults find their families simply cannot provide all the supports they need (p. 35).

To address these inequities, the report argues that education reform, along with private and public partnerships, is necessary to provide students the opportunity to learn information within a real-world context, and to provide a choice in learning environments that focus not just on how things work, but why and for what purposes. Public education is complex and surrounded by contentious emotional, social, economic, and political divisions that make education reform a challenging proposal. Given the current and projected state of public school education, and how school deficiencies relates to social, political and economic outcomes it is even more difficult to imagine going forward without a major restructuring.

The Center on Education Policy compiled and released a report in 2012 that consolidated education statistics from federal and select education sources and painted a picture of the overall state of education in the United States (see Table 1). Class inequities are prevalent and the impact of this disparity in education relate directly to class size, student access to qualified teachers, drop-out rates, and a continued divide in ICT accessibility and usage. Schools and teachers are under-funded and yet are charged with the incredible task of providing an equal education for all students despite the greater challenges that students who come from low income families face. Class is at the heart of the digital divide and is perpetuated through the education divide.

Table 1: The State of Education in the United States[3]

Education Institutions
There are 14,000 local school districts in the U.S.
There are 99,000 schools in the U.S.
The largest school districts have enrollments of 25,000 or more students. These districts make up only 2% of all the districts. **These districts educate 35% of the nation's students.**
Half of U.S. school districts are small (less than 1,000 students). These districts educate just 6% of nation's students. **The majority of students are in districts with enrollments of 10,000 or more.**
Average elementary school class size is 20. Average secondary school class size is 23.
Student Data
55 million students are educated in public schools: Pre-K through 12 grades
35% of all public school students go to suburban schools. 29% of all public school students attend large city schools. 24% of all public school students attend rural schools. 12% of all public school students attend small towns.
Poverty and Education
The majority of African American and Latino students attend schools in large cities. The majority of White students attend suburban and rural schools.
The Census Bureau defines **poor families as those with annual incomes below the federal poverty threshold level of $22,050 for a family of four**. By this measure, 19% of school-age children are from poor families.
66% of African American students, 67% of Latino students, and 57% of Native American students attend schools where more than half of the students are poor. Compare these figures to 32% of Asian students and 24% of White students who attend such schools.
Students are eligible for free lunch if their family income does not exceed 130% of the federal poverty level; students are eligible for reduced-price lunch if their family income is above 130% but below 185% of the poverty level. By this measure, **45% of public school children are from low-income families.**
English Language Learners (ELL)
1 in 10 (11%) of U.S. students are ELL. 4 out of 5 ELL learners are native Spanish speakers.
More than 400 languages are spoken by ELLs in U.S. schools. Spanish accounts for 80% of all ELLs.

[3] All statistics and facts noted here are taken from the Center on Education Policy report (Kober, et. al, 2012) from January, 2012, titled, *A Public Education Primer: Basic (and Sometime Surprising) Facts about the U.S. Education System.*

Table 1: The State of Education in the United States,[4] cont.

Education Expenditures
Per pupil expenditures in 1997-1998: $8,860 Per pupil expenditures in 2007-2008: $11,134
61% of spending goes towards instruction (salaries, benefits, supplies). **10% of spending goes to operations and maintenance.** **5% of spending goes to instructional staff services (curriculum dev, training, libraries, computer centers).** 8% of spending goes to administration.
More than 90% of funding for public schools comes from state and local sources (48% from states; 44% local sources). More than three-quarters of the local portion is from local property taxes. The federal government contributes 8% of total revenues.
The level of public investment in education has changed little over the past 10 years.
Large gaps exist in spending between states and between locales.
Most local revenues for education come from property taxes. School district budgets are closely tied to the wealth of the surrounding community. It is not uncommon for the wealthiest district in a state to spend twice as much per pupil as the poorest district.
Student Performance
High income students outperform low income students in standardized tests.
1 in 10 school youth aged 16-24 lack a high school diploma or equivalent. 8% of all students drop out of school. **The percentage of youth aged 16-24 who were not enrolled in high school and lacked a high school credential include: 19% of Latino students, 15% of Native American students, 10% of African American students,** 5% of White students, and 4% of Asian students.
On major international assessments, U.S. students perform in the middle or upper middle range in reading, math, and science. U.S. performance lags behind that of several U.S. global competitors.

[4] All statistics and facts noted here are taken from the Center on Education Policy report (Kober, et. al, 2012) from January, 2012, titled, *A Public Education Primer: Basic (and Sometime Surprising) Facts about the U.S. Education System.*

Table 1: The State of Education in the United States,[5] cont.

Teacher Attributes
52% of public school teachers have an MA degree or higher.
53% of teachers have more than 10 years of full-time teaching experience; 20% have more than 20 years; 34% have 3-9 years; 13% have less than 3 years.
The teaching workforce has been consistent since 1999: 75% female, 83% White 7% Latino; 7% African American.
1% of public school teachers are ESL/bilingual.
8% of teachers leave the profession each year. 8% of teachers change schools each year.
Students in high-poverty schools are more likely to be taught by an out-of-field teacher or a first-year-teacher than students in low-poverty schools. High-poverty schools employ a greater-than-average share of first-year teachers.
Teachers worked an average of 52 hours per week. 37 hours were required during the school day. The remaining time was devoted to additional instruction-related activities such as lesson planning, grading, or non-instructional work that teachers may or may not be compensated for.
Average teacher salary in the U.S.: $49,600. Teachers make 61% of the average salary of other U.S. employees with the same experience and college education. The U.S. ranks 22nd or 24th out of 28 OECD countries in terms of ratio of average teacher salaries to average earnings of other workers with similar experience and education.

These data reflect that education in the United States is not equitable from a social or economic standpoint. Race and class affect the quality of education that students receive as well as their employment and post-secondary opportunities. Teachers are overworked and underpaid despite their high levels of education, commitment, and experience. Schools are underfunded and limited in what they can achieve, especially with relationship to spending on operations and maintenance, teacher salaries, and instructional staff services. The education system is complex and decentralized, and many social, cultural, and economic factors contribute to such inequity. Making broad

[5] All statistics and facts noted here are taken from the Center on Education Policy report (Kober, et. al, 2012) from January, 2012, titled, *A Public Education Primer: Basic (and Sometime Surprising) Facts about the U.S. Education System.*

and effective education reform is difficult on many levels, but without changes, the situation will continue to deteriorate. There are many elements to education reform. Most education stakeholders behind reform efforts believe that integrating information and communication technologies (ICTs) into schools is a key part of education reform and, ultimately, student success on a personal and professional level.

Many facets of government— from the department of commerce and the department of defense to the department of education— recognize technology in schools as important to the national interest. Technology, it is believed, can create better learning environments, equitable access for an engaged citizenry and a stronger economy, and a safeguarding of our telecommunications infrastructure. Preparing skilled graduates, for example, helps to ensure an adequate workforce to support and safeguard the national infrastructure against terrorism and hacking. The Council on Foreign Relations recently released a *U.S. Education Reform and National Security* report in 2012, which noted that students must gain technology skills to continue to develop, support and protect our national technology infrastructure. The report also notes that technology integration is critical to facilitating innovation, which helps to spur economic growth. Although the report states that the majority of schools have now achieved full technology infrastructure, the committee presenting the report argues that, “technology is largely still being used to advance old-style teaching and learning with old-fashioned uses of human capital. That is computers and digital technology have thus far not been used innovatively to change the way the United States educates its students, but instead simply to reinforce past practices” (p. 33). Like the other reports mentioned so far, this report highlights the

Partnership for 21st Century Skills as exemplary in terms of the efforts they are putting forth to reform education— to help students build stronger core knowledge in academic subjects and develop twenty-first century content such as building global, financial, and environmental awareness; fostering learning and thinking skills such as creativity, critical thinking and problem solving; increasing communication and collaboration effectiveness; developing information and communications technology skills; and building life and career skills such as time management, and leadership qualities. Overall, the thinking is that students who graduate with computer and networking skills and who can use ICTs effectively to learn and communicate contribute to a stronger workforce that can compete better in the global marketplace.

The Obama administration has focused its education reform efforts around the ability of states, districts, and schools to embrace technology and innovation. In the National Education Technology Plan (2010) titled *Transforming American Education: Learning Powered by Technology*, school reform efforts depend on technology integration and innovation for success. Listed here are the current education priority and the stated goals of the Obama administration:

- To raise the proportion of college graduates (from both two and four-year universities) from 41 percent to 60 percent by the year 2020.
- To close the achievement gap across schools so that all students graduate from high school with the knowledge and skills they need to succeed in college and the workplace.

To achieve these goals, the Department of Education is advocating major education reform by providing recommendations to states, districts, and schools to embrace innovation, implement change quickly, evaluate efforts, and continually improve based on evaluation results. The technology plan proposes revolutionary transformation at all levels of education, which requires that each part of the system create clear outcomes and objectives, participate in collaborative opportunities to redesign structures and processes, engage in constant evaluation and measurement of performance, and be accountable. Technology is framed as the engine that will allow for these goals and strategies to work.

> The plan recognizes that technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. Technology-based learning and assessment systems will be pivotal in improving students learning and generating data that can be used to continuously improve the education system at all levels. Technology will help us execute collaborative teaching strategies combined with professional learning that better prepare and enhance educators' competencies and expertise over the course of their careers. To shorten our learning curve, we should look to other kinds of enterprises, such as business and entertainment that have used technology to improve outcomes while increasing productivity.
>
> We should also implement a new approach to research and development (R&D) in education that focuses on scaling innovative best practices in the use of technology in teaching and learning, transferring existing and emerging technology innovations into education, sustaining the R&D for education work that is being done by such organizations as the National Science Foundation, and creating a new organization to address major R&D challenges at the intersection of learning sciences, technology, and education…
>
> The challenging and rapidly changing demands of our global economy tell us what people need to know and who needs to learn. Advances in learning sciences show us how people learn. Technology makes it possible for us to act on this knowledge and understanding (Executive Summary).

Additionally, the report frames technology as a way to:

- Engage and empower learning experiences for all students
- Improve what we assess and how we assess in terms of student success to continually refine and approve instruction
- Support teachers as professionals, giving them 24/7 access to professional networks, content, and resources in order to facilitate collaboration with other colleagues and provide continuous and meaningful professional learning opportunities
- Create 24/7 computer and Internet access regardless of location to students, teachers, and administrators
- Create greater efficiencies in teaching and learning by restructuring what a school day looks like– concerned less with seat time and more with content and competence that meets each individual students' needs and schedules

These technology goals align with what business and professional education organization leaders have been championing for decades. The focus on twenty-first century learning and technology integration is consistent across government, business, education, and nonprofit sectors. The Software and Information Industry Association (SIIA), a trade association for the software and digital content industry, notes the following in their 2011 *Vision K-20 Report*, the following:

> Software & Information Industry Association (SIIA) member companies are the providers of technology tools and digital content that is essential for education in the 21st Century. The SIIA Vision K-12 Initiative promotes the best uses of technology to ensure that all U.S. students have access to a teaching and learning environment capable of preparing them to compete globally and lead the world in innovation.
> The K-20 Vision is centered on the belief that every K-12 institution should have an instructional and institutional framework that embraces technology and eLearning to:
>
> - Increase student engagement and achievement
> - Provide equity and access to new learning opportunities
> - Document and track student performance
> - Empower collaborative learning communities
> - Maximize teaching and administrative effectiveness
> - Build student proficiencies in 21st Century skills

Computer-using teachers, instructional technology specialists, campus and district technology coordinators, librarians, and nonprofit membership organizations, such as the International Society for Technology in Education (ISTE), have been making similar claims and pushing for technology integration since the 1970s. Scholars have examined various benefits, or rationales for incorporating technology into instruction, in addition to the challenges and drawbacks of doing so. Similar to the P21 initiative, Collins & Halverson (2009) expound on the appeal of technology in terms of how it relates to new expectations for learning. They liken the traditional classroom to a factory-like production line and argue that by engaging students in a more interactive fashion— based on inquiry and student interests, with explorations facilitated through the use of technology—learning becomes more real and participatory for students. Lei & Gupta (2010) and Warschauer (2011) examine how the meaningful and purposeful incorporation of technology and online learning opportunities can not only make learning more effective and engaging for students, it can make instruction more interesting for teachers and can create greater administrative efficiencies for teachers and administrators. As technology has flooded the consumer marketplace with laptop computers, game consoles, smart phones, iPads, and Androids, research has begun to examine students' demand for technology in education.

Watkins (2009) and Prensky (2001a, 2010) spent time examining children who have grown up using technology in their social lives to better understand what technology means to the personal and academic lives of these young people. They found that many students feel that school is boring and irrelevant because they are expected to power down the technology they have come to rely on in their social and personal lives. This technological disconnect from education not only serves to disengage students in the learning process by making it more personally and socially irrelevant, it also misses an opportunity to teach students information literacy and how to engage with technology in an effective, professional ,and critical way.

This market proliferation has also encouraged scholars like Prensky (2001b), Oblinger & Oblinger (2005), and McLeod & Lehmann (2012) to examine physical changes in the brain and cognitive functions and impacts on learning styles that are facilitated by the use of technology. They argue that because students have grown up using technology in many forms, for many functions, and often simultaneously, their brains function differently than others without this experience. This exposure to technology, social networks and digital content thus demands different and faster cognitive processing that engages multiple inputs from different parts of the brain. This new type of learner requires that we not only integrate technology into instruction, but that we also consider special accommodations to make learning more relevant to students today. These shifts include providing more inquiry-based, contextualized learning that relates directly to students' own interests and experiences and how they engage with technology to communicate and share information in creative ways. The narrative of using technology to develop twenty-first century skills, empower learners and teachers, foster effective instruction, and provide equitable access to education is commonly represented amongst education stakeholders and the popular media.

PRODUCTION OF CULTURE/CULTURE OF PRODUCTION

Together, technology integration and twenty-first century education reform has fostered public and private coalitions and partnerships among a variety of education stakeholders to try to initiate, rationalize, and speed up the rate of change for improving education in the United States. Each group of stakeholders continually contributes to and evolves this narrative by cycling ideas, concerns, benefits, proposals, funding, and advocacy efforts to produce a culture of instructional technology. Each sector of government, education, business, and nonprofits concerned with integration of instructional technology in schools has vested interests and common overall goals. These stakeholders work together to set the agenda (Gitlin, 1978) in terms of communicating what they believe to be most important about ICTs in education and establishing a conversation or normalization and inevitability around the need for, and use of ICTs in education. Akin to the scholarship and research put forward by Du Gay's cultural study of the Sony Walkman (1997a) and production of culture (1997b), these stakeholders engage in a production of instructional technology culture within a circuit of culture that involves representation, identity, production, consumption and regulation of that culture. Recognizing the relationship between cultural production and the economy is critical to this examination and facilitates a greater understanding of the production of culture and the cultures within which that production takes place. For Du Gay, it is not solely an issue of whether it is the economy or culture that has more prominence; instead Du Gay examines the blending of these factors and how and why culture comes to be as a result. Like films, television, and music that we manufacture as part of cultural consumption, we also produce an instructional technology culture that has its own set of expectations in representation, identity, production, consumption, and regulation through the development of education technology standards and alignment to what constitutes twenty-first century learning. Although political economy theories would examine cultural production in relationship to issues of power and control of political and economic forces, examining cultural economy allows for the examination of cultural development and its relationship to the economy, which is not influenced by political economy alone. As Du Gay quotes Stuart Hall (1997b, p. 3), "'culture is involved in all those practices…which carry meaning and value for us, which need to be meaningfully interpreted by others, or which depend on meaning for their effective operation. Culture, in this sense, permeates all of society.'" To examine cultural production and the *normalization* of the narrative surrounding instructional technology culture across the social, political, and economic sectors is critical because each contributes in a meaningful way and works towards establishing expectations and concentrated efforts in education that affect not only the students, teachers, and administrators, but influence common perceptions about what is and is not important about technology in education. Analyzing how cultures of production influence the production of culture is of utmost importance to gain insight into how and why certain decisions are made and how different stakeholders in the process are affected. Cultural meaning is produced in many different ways among a variety of stakeholders and circulated through each of the organizational practices and process in which each stakeholder is engaged. This circuit of culture contributes to a shared and accepted meaning reflective of the culture that is produced and recycled through a continual dialogue and engagement among these stakeholders. This differs from a hypodermic-like model of communication theory (Bineham, 1988) that envisions elites controlling and constructing messages and injecting them into the receptive masses. The production of culture/culture of production theory DuGay (1997b) presents also differs from the theoretical orientation of political economy of media where political and economic powers converge to manipulate the narrative and control the outcome (McChesney, 2008). Instead, DuGay (1997b) describes an intertwined and complex set of influences over cultural production that includes political and economic factors alongside the individual and social realities that together are inherently part of cultural production.

Du Gay (1997b) highlights the tension between macro perspectives of cultural production— focused on corporate control, which attributes political economic control over cultural production by the cultural industry focused on profit and mass consumption (Adorno and Horkheimer, 1979)— and a micro perspective of cultural production— which involves individual agency and interpretation of meaning. For Du Gay, there are elements of each of these perspectives in the circuit of culture. For education, the same holds true. There are economic and political gains to be made by incorporating technology in education on a global scale. There are also ethical, political, educational, and social motivations, and all stakeholders in this culture of production contribute to this dialogue. The audience, or receivers, of this narrative include administrators, teachers, parents, students, and tax-payers; some of these stakeholders embrace the instructional technology culture and others do not. The stakes are high for education because political and economic decisions about how to fund and support ICTs are ultimately influenced by the narrative produced by the stakeholder culture which has very real socio-economic consequences for schools and the students they serve.

As the chart in Table 1 reflecting the state of education in the United States shows, poor, non-White communities are faring worst economically, as reflected in the education system and in society overall. Money is limited, especially in education. Ubiquitous access to technology for all is far from reality; inequities reinforced by education and by accessibility to technology will continue to grow. We must examine the culture of production and the production of instructional technology culture to better understand which cultural narratives (and subsequent policies and funding sources) are being produced. At the same time, we must recognize which narratives are being neglected as part of this circuit of culture. Technology is a key part of our society, economically, politically, and socially; integrating technology in education is imperative. We have engaged in this production of culture and shaped the decision to make technology a critical part of our international social fabric for all the benefits and challenges it presents. It is up to us to influence the narrative and deepen the dialogue to emphasize not just what is missing from education in terms of our ability to address the curriculum needs of the twenty-first century workforce, but to approach solutions to key issues that are at the heart of the education divide in the United States and internationally. These keys issues relate to the digital divide and the inability to develop ubiquitous, equitable infrastructure and tech support for the education community and the ineffective implementation of education development projects related to instructional technology. As with the state of the education divide, similar trends are visible in technology infrastructure across socio-economic lines at home and at school.

THE ENDURING DIVIDE: GLOBAL ACCESSIBILITY TO ICTS

Having access to ICTs involves a set of complex factors embedded within physical, mental, digital, social, and cultural influences. The digital divide early on was focused upon those how had physical access to computers and the Internet and those who did not. While this type of accessibility is still an important and challenging issue, there are many other complicating factors that contribute to the ever-present divide. Issues surrounding Internet speed, literacy, language, education, social and cultural resources and supports all influence meaningful access to and use of ICTs. The following section explores the continued and stark physical discrepancies in ICT access in globally and in the United States specifically in addition to other key issues that widen the divide between those who can meaningfully participate in the information age and those who are marginalized outside of it.

Global ICT Integration

The digital divide is often framed in terms of accessibly or lack thereof to ICTs within nations and amongst nations. The global digital divide is typically represented as a comparison between the developed western nations and the rest of the developing world. Recent reports and research surrounding the global digital divide often begin with an announcement that great gains have been made in global growth of ICTs (ITU, 2011; WSIS, 2005; UN, 2012). The latest report issued by the International

Telecommunication Union (2011b) for example notes that, "Over the past two years, the world has witnessed continuous growth of ICT services and uptake worldwide. All 152 economies included…have improved their scores, confirming the continuous spread of ICTs and the growing information society…The affordability of ICT services is key to bringing more people into the information age" (p. iii). Contrast this statement with another sentence from the same report, "The results show that ICT prices continue to fall, in particular fixed-broadband prices, which dropped by more than 50 per cent over the past two years. While this is extremely encouraging, broadband is still too expensive in many developing countries, *where it costs on average more than 100 per cent of monthly income [emphasis is mine]*, compared with 1.5 per cent in developed countries" (p. iii). Economic disparities correlated to ICT access among regions of the world are evident in Table 2.

Table 2: Percentage of households with Internet access, by region, 2011

(ITU World Telecommunication/ICT Indicators database http://www.itu.int/ict/statistics)

Europe	70.9
The Americas	51.1
Commonwealth of Independent States	37.3
World	34.1
Arab States	25.7
Asia and Pacific	24.5
Africa	4.1

While it is true that there are many complex facets to the digital divide at the global and national level that must be considered, this physical and monetary barrier to accessing ICTs in difficult to refute (Chinn & Fairlie, 2004). Compare, for example, the number of households with Internet access between 2002-2012 in from developed nations at 65.5 percent, developing nations at 15.8 percent, and a global average of 29.5 percent (ITU, 2011, p. 4). The ITU in collaboration with the World Summit on the Information Society reported (2010, p. 3) that despite growth in mobile penetration in poor and rural communities worldwide, broadband is out of reach due to the fact that there is no access to electricity, let alone living wages to support access to it. Because of this global disparity research tends to focus on economic and telecommunication policy solutions driven by national and international governments and corporations to address the divide represented in poor nations. This includes calling for the promotion of ICT infrastructural investments by wealthy countries (White, et. al., 2008), creating national telecommunications policies that provide better and cheaper access (Chen & Wellman, 2004), and promoting ICTs through education (Sipior et.al., 2003). Of course, as Warschauer (2003) warns, framing the digital divide as a "binary divide is…inaccurate and can be patronizing, as it fails to value the social resources that diverse groups bring to the table" (p. 297). The concern here is that if we conceptualize of the digital divide in terms of physical access alone, we are deceived into thinking that once ICTs are placed in front of the 'have-nots' the problem of the divide will be solved. This is a dangerous way to position solutions to the digital divide because it prevents more critical analysis of other key social, cultural, economic, and political factors that weigh just as heavily in communities where there may be access under-utilization of ICTs.

In Egypt, for example, Warschauer (2003) conducted a 3-year longitudinal case study examining educational technology efforts the government made to integrate ICTs into schools which he notes are falling behind compared to other developing nations. He notes that key issues affecting this lack of educational success centered largely around "large class sizes; poorly trained teachers with low wages and status; and a centralized, test-driven curriculum focusing on rote memorization of unimportant material" (p. 299). Instead of addressing these identified issues in a significant way, the Egyptian government decided instead to funnel significant funding into ICTs integration with the rationale of catching up to and competing with Western nations and bridging the rural-urban divide within Egypt. The results of this costly effort did not impact the quality of education in Egypt. In fact, Warschauer (2003) notes that purchased computers went unused and were even locked away to prevent loss of their expensive investment in equipment. Teachers were restricted by the types of software that could be used for fear of virus penetration, and much of the digital material provided was not useful for instruction. Well-intended donors (USAID) supported the hardware and Internet connectivity, but did not address key issues facing the education system, nor did it consider the realities and instructional needs of the teachers in the classroom, the interests of the students, the support system required to maintain the physical, digital, human, and social resources necessary to make this ICT infrastructure beneficial and worth the incredible monetary investment.

This type of scenario is not limited to non-Western or poor countries. What it illustrates is that solutions to addressing the digital divide, in any nation, include not only physical accessibility to ICTs but a deliberate and planned effort in response to local needs. Education and ICTs as a development project provide great opportunity for such planned efforts but the reality of ICT infrastructure in poor countries is reflected in accessibility in schools. One of the major problems is that there is no solid data surrounding ICT infrastructure in schools on a global level. There is no common method for agencies such as UNESCO or the World Bank to capture this data, or for national ministries to report out. International agencies including UNESCO, WSIS, OECD, and the World Bank are working to develop ICT in education indicators that could be used by official education administrators to make it possible to understand the level of ICT infrastructure and usage in schools. What is known is that roughly 61 million children who are of school age globally are not currently going to school. (UNESCO, 2012). UNESCO (2012) reports that of these 61 million children:

- 1 million are in North America and Western Europe
- 1 million in Central and Eastern Europe
- 3 million are in Latin America and the Caribbean
- 5 million in Arab states
- 7 million in East Asia and the Pacific
- 13 million in South and West Asia
- 31 million in sub-Saharan Africa

In addition to the challenges of getting children in school or keeping them enrolled, many schools in poor nations face these additional challenges (Guttman, 2003):

- classrooms with excessive student-to-teacher ratios
- teacher shortages
- unqualified teachers
- lack of electricity
- lack of phones, radios, and televisions

- lack of pens, pencils, rulers, blackboards, and textbooks

For now, examining national level ICT statistics, such as those represented in Table 2, along with national education statistics help provide a small sample of the incredible challenges that poor nations face in establishing basic living standards for their populations. When national goals include using ICTs for development in poor countries special national infrastructure considerations along with local challenges and needs must be considered to ensure the investments in ICTs work towards alleviating tremendous social and economic challenges.

In international development initiatives, ICTs are often framed as addressing a ‘digital divide’ that exists within society. A contested concept, the digital divide largely addresses the fact some people have access to technology while others do not and that because ICTs are considered such an economically and socially important part of global society, governments and corporations have made it a key national and international issue. Efforts to bridge the digital divide range from addressing infrastructure to support the use of ICTs, to having physical access to hardware and software, and finally to issues related to social and cultural barriers in terms of if, how and why individuals and groups may be motivated or discouraged to use technology. Some argue that the market will eventually address most aspects of the divide as equipment becomes cheaper and institutions such as schools become fully integrated with technology (Compaine, 2001), or as national governments provide greater legal reform and remove barriers that will allow innovative Western-educated local entrepreneurs to create greater integration of

ICTs into developing nations (Wilson, 2004). Others recognize that the incorporation of ICTs in society simply reflects, supports and expands existing social relationships and structures (Webster, 2003); still others argue more critically that the digital divide is reflective of social disparities between rich and poor individuals and groups located in all nations, and that this focus on ICTs for development may actually be reinforcing existing social inequities (Mody, 1999).

Recognizing that technology is a social phenomenon and that its development is a subjective practice of those in control of its creation, it is not always easy to anticipate how it will evolve as individuals, societies and nations appropriate it (Mackay, 1995). However, it is critical to analyze and deconstruct how development projects frame ICTs within their initiatives in order to reveal their subjective intent. This type of analysis can help us to understand why the development project, overall, has been unsuccessful in making social change for the poorest individuals around the world. An analysis of this sort can also help generate new ideas that may be more effective.

The first question that might be asked is why or how ICTs became such a key resource for development in the first place. According to Luyt (2004), a complex synergy arose from deliberate national and international policy efforts of four entities: those individuals and companies directly involved in ICT industries and corporations seeking cheap sources of global labor, governments and elites of developing nations seeking greater economic opportunities, the development 'industry,' which Luyt claims has regained legitimacy by coming to the 'aide' of the digital divide, and finally, individuals and groups participating in the realm of global civil society. Luyt acknowledges that not all of these efforts have been malicious or ineffective in making positive change. Like Selwyn (2002), he recognizes that the digital divide reflects existing social inequities, but they both believe that ICTs can be used as a remedy if only national and international policies could be redirected to be more socially inclusive. For poor nations struggling to meet the most basic of needs, an incredibly deliberate and purposeful approach to ICT integration is required.

ICT Integration in the United States

As with the so-called promising gains made in addressing the global digital divide, in reading the 2010 Digest of Education Statistics (National Center for Education Statistics, 2010) it could be tempting to believe that we have reached the goal of full technology penetration in schools across the U.S. The report states that in 2008 the average public school had 189 computers available for instruction and that 98 percent of those were connected to the Internet. This equates to three students per computer with Internet access. However, it is less clear and more difficult to determine what types of technologies are being used, in what ways, and at what pace. The Pew Research Center (Flamm, et. al., 2007) analyzed the challenges for effectively measuring broadband as due to the fact that there is too much variability across and within states. The differences between federal, state, and local regulatory bodies, vendors, and population demographics make broadband tracking, let alone national ubiquitous availability a seemingly impossible task. To try and accomplish broadband integration into schools, the federal government implemented the E-Rate program in 1997. This program provided discounted access to telecommunications and Internet access for U.S. public schools and libraries through a competitive bid process. Again, tracking success of this program has been difficult due to administrative reporting inconsistencies and variability in data collection across states and school districts.

The U.S. Department of Commerce uses the U.S. Census Bureau's population survey of Internet usage to try and determine broadband penetration rates in U.S. households. Documented in the 2010 report (U.S. Department of Commerce, 2010) is a steady increase in overall broadband adoption with 64 percent of U.S. households using broadband Internet in 2009 and 5 percent using dialup services, accounting for 69 percent of U.S. households accessing the Internet at home. An additional 8 percent noted that they use the Internet outside of the home due to prohibitive cost. This leaves 36 percent of U.S. households without broadband use at home and 23 percent without any use of the Internet in or outside of the home. This gap relates closest to socio-economic, demographic, and geographic factors. For example, the highest rates of broadband adoption were among Asian and White populations and among those with higher incomes and more education. These trends are similar to what we see in terms of socio-economic divides represented in education and in overall technology access.

Various private industries, foundations, and sectors of the government from the federal, state, and local level have implemented policy and funding opportunities to help get schools networked and teachers trained in using technology effectively in classroom instruction. While the majority of schools may now be networked with some type of Internet access, there is great variability in terms of high-speed broadband access in addition to ongoing funding and technical support that is available to schools and teachers. When schools cannot afford to upgrade their technology and infrastructure, or do not have the ability to hire tech support staff, if there are not qualified staff to hire, and if there are not enough staff to meet the needs of all teachers in a school, or multiple schools, technology becomes more of a hassle than a benefit to teachers and students and ultimately goes unused.

Access to computers is typically made available to teachers and/or students through specific classrooms or labs, and through the use of at least one computer for each classroom, or through roving sets of computers that are shared among classrooms. With the many innovations and progress that have been made, there is little question that schools now have many more computers with Internet access than they did in 1999 when the National Telecommunications and Information Administration (NTIA) in the U.S. Department of Commerce released the report, Falling through the Net: Defining the Digital Divide. However, gaps in access continue among schools in terms of access to high quality hardware and software, broadband connectivity, as well as instructional technology and technology troubleshooting support staff. Because many schools and districts fund their technology needs through grants and other one-time sources, it is very easy for technology and connectivity to become quickly out of date, full of technical bugs, and because of these complications, serve as a deterrent for teachers to spend the small amount of time they have for planning on figuring out how to use technology to enhance their instruction. This is especially true when technology does not work properly and there isn't anyone to help on a moment's notice when things go wrong. Low-income communities, individuals, and the schools face a common set of barriers to technology access and use. Defining the digital divide as simply a gap between those who do and do not have access to technology does not account for all of the interwoven social, cultural, and economic complications that contribute to such inequitable distribution and use of technology.

The Pew Research Center conducted a landline and cell phone survey to representative of adults across the continental United States with 2,260 English and Spanish-speakers ages 18 and older, between July 25 and August 26, 2011 as part of the ongoing Internet and American Life Project. The report from this survey (Zickuhr and Smith, 2012) show that the digital divide persists with one in five adults not using the Internet. Even with the pronounced increase in access to the Internet via mobile technologies across socio-economic lines, variability in access and use to broadband persists. Reflective of Internet adoption overall, difference in age, household income, and education remain key factors to broadband accessibility. For example, broadband adoption rates among college graduates hover at 85 percent, while only 22 percent of adults not completing high school, use broadband. For those ages 30 and under, 76 percent use broadband versus only 30 percent of seniors 65 and older. Finally, the report notes that for those earning $75,000 or more per year have an 89 percent broadband adoption rate versus only 41 percent of those earning $30,000 or less. Among those adults who reported they were not using the Internet at all, half reported lack of personal relevancy as their reason, noting that neither they, nor anyone in their home had ever used the Internet before. The report also found that younger adults, minority populations, those without any previous college and those with lower income levels were more likely than other groups to use smartphones as the main device for accessing the Internet. The results of these current data reflect much of the research that has taken place since the 1990s.

Scholars have been concerned with the effects that lack of Internet access has on employability (Bishop & Lisheron, 2002), as well as broader structural factors that work to maintain social and economic disparities among poor and minority communities (Pinkett, 2003; Stanley, 2003). In addition to political and economic factors, research has also examined how language and literacy barriers, social and cultural capital, and difference among race, and gender affect technology access and use (Murelli, 2002; Pippa, 2001; and Bolt & Crawford, 2000). More recent research focuses on lack of broadband access and the myriad complications that lack of high-speed infrastructure has on society from limiting access to healthcare and seeking and applying for employment (DiMaggio and Hargittai, 2001) to enforcing limitations that go beyond access and include broader issues of lacking ubiquitous, unlimited and unmonitored access, technical or information literacy skills, social support systems that model behaviors or provide assistance, or lack of overall sense of need for or personal relevancy for using technology (Warschauer, 2003). Similarly, in a study between urban and rural broadband adoption LaRose and his colleagues (2007) found persistent gaps were attributed more to age, income, and individual differences in motivation to adopt broadband than to education level or ethnicity, noting that perceived personal benefit and relevancy were critical to rural broadband adoption. Researchers noted that without the ability to take social and behavioral cues of broadband use from others it is difficult for individuals to visualize their own use of such tools. While private and public efforts may try to focus on providing more rural broadband access, other issues related to perceived and demonstrated value of self and others are critical to successful adoption. Many scholars (Hoffman & Novak, 1998; Hoffman, Novak & Schlosser, 2001; Kaiser, 1999; Strover & Straubhaar, 2000a, 2000b; Wilhelm, 1998; Fuentes-Bautista, 2007; Straubhaar et. al, 2012) interested in this perceived lack of relevancy and barriers to technology access and use related to ethnicity have explored various social and cultural barriers that work to widen the digital divide. Strover and Straubhaar (2000a), for example, conducted surveys in Texas and found that lack of access and use of technology among Latino and African-American communities was not only linked to economic disparities, but also to having lack of time, issues related to perceived difficulty in use, and privacy concerns.

Research has relied on various theories concerning social and cultural barriers to the digital divide as they relate to learned or ingrained social structures and behaviors due to financial position, social networks, or cultural experiences (Bertaux & Thompson, 1997; Bourdieu, 1984, 1985; Gonzales, 2001; Putnam,1995, 2000; Rojas, et. al., 2002). Access to and participation within the broader social context of power influences the social, cultural and economic position of individuals and getting access to this power is often passed down through familial ties and reinforced by institutions such as schools and churches. Individuals develop what Bourdieu (1984) calls ‘habitus’ – a set of social norms and behaviors accepted among members of the same social class. It is the individual’s place within these networks that can contribute to access, or lack thereof, to power, or certain resources, information, and activities, such as employment, education, or in this case, the use of and access to computers and the Internet (Rojas et al., 2002; Bourdieu, 1985). Rojas and her co-authors define cultural capital as "the possession of certain cultural competencies - bodies of cultural knowledge that provide for distinguished modes of cultural consumption. Just as economic relations that express the networks of power are quantified as economic capital, the cultural relations that express different levels of learned and empowering potentialities, constitute the cultural capital" (p. 3). Social capital relates to a person's perceived and real acceptance into social networks or relationships. Whereas cultural capital is an acquired cultural knowledge, social capital is access to "actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships" (Bourdieu 1985, p. 249). Rojas (2002) use these concepts to explain why working-class and poor Latinos and African-Americans in Austin, Texas are not using computers at the same rate as Whites. They argue that social norms, relations, and experiences may not encourage or reflect the positive use of these technologies, discouraging use despite accessibility of facilities. In order for an individual to utilize technology, they must develop what Rojas (2002) call techno-capital/competencies, or the ability to obtain the wherewithal to know and apply technology in both private and public domains.

In 2011, Martin Hilbert reviewed digital divide research to examine how the issue has been conceptualized or defined. He concluded that the desired outcomes of those stakeholders trying to address the digital divide are so vast and varied that there is no one common conceptualization or definition to frame the digital divide; nor, he argues, should there be one. He also notes that stakeholders have different reasons to advocate for ICTs and that “different ends justify different definitions” (p. 76). Because there are so many different potential outcomes for using ICTs for social change, creating a common definition or conceptualization of the divide is socially detrimental. In this case, it is the goal of the social effort that should determine how ICTs get implemented and because each effort and desired outcome is so different, the means and expectations for ICT deployment must be equally unique. To Hilbert (2011) “The ends should determine the means, not the other way around. Since there are no common ends in the deployment of ICT, it is counterproductive to pursue common means. There are only complementary definitions of the digital that fall into common categories and pursue one multifaceted final goal: achieving positive impacts from the deployment of ICT. These insights lead to an emerging consensus among scholars. ‘The new consensus recognizes that they key question is not how to connect people to a specific network through a specific device, but how to extend the expected gains from new ICTs” (p. 733). The complexities that surround the digital divide are critical for understanding how to equip schools to provide a solution to this problem. Trends in education outcomes mimic trends in the digital divide – poor and minority students are placed at the greatest disadvantage and have the most to lose. The structural and perceived barriers to education and technology, especially without the support of social and cultural capital, make recognizing the social, political, and economic value that these resources can provide difficult to appreciate. At the theorized center of democracy, education is projected as providing equal opportunities, but can actually serve to reinforce educational and technological inequities surrounding issues of race and income. Schools are publicly funded and are bounded by law to provide high-quality education for all students. Schools are indeed one of the only public institutions where providing full digital equity has a chance – and yet this digital equity is not happening in practice. Finding solutions to the digital divide, as Hilbert (2011) says is not a one-size-fits-all proposition, but requires building a deeper understanding of student and teacher realities in each locality, creating an equal expectation for digital infrastructure and support. Every citizen should expect to see the same high *level* of hardware, software, and high-speed infrastructure, supported by the same ongoing level of technical and instructional support at every school, regardless of which neighborhoods in which they serve. Setting the bar high in terms of instituting instructional technology standards is important, but creating an infrastructure that ensures teacher and student success is critical to reaching full and effective implementation. The digital divide supported by the current structural inequities of education will continue to exist and evolve as technologies and infrastructural options continue to change, improve, and become more and more integrated into the social, political, and economic fabric. The barriers of instructional technology adoption in schools are many and include difficult challenges such as lack of funding, ongoing problems related to infrastructure and upgrades, lack of ongoing tech and instructional support, and lack of overall coordinated vision. However, one of the most visible barriers that is present in research and popular media, along with educational failure overall, is the real and perceived failure of the classroom teacher. Scholars have found that classroom teachers and teacher leaders are a critical factor that fosters student success in the classroom (Crowther, Ferguson & Hann, 2009; Klem & Connell, 2004). It is also becoming more clear that standardized testing and lack of teacher autonomy are leading to decline in teacher efficacy and student success (Giles & Hargreaves, 2006) and that when schools or students fail, teachers are attributed blame (Santos & Gebeloff, 2012). The same is true with technology integration in the classroom – teachers are seen as the key to improving classroom instruction with technology use but they are also blamed when successful integration does not take place. Educational standards, in this case education technology standards, are seen as a way to bridge the digital divide by creating a common expectation of what every student should know and be able to do with technology. However, these standards do not account for the myriad other barriers that make the standards irrelevant for teachers and students. The focus on standards masks the underlying and ongoing structural problems and instead places blame on teachers and students for social and economic influences that out of their control. Understanding how the issue of the digital divide and standards are framed is critical to discovering new solutions to bridging the digital divide through schools and the issue includes, but goes beyond implementing instructional technology standards and teacher training.

TEACHERS: BEARING THE RESPONSIBILITY OF TECHNOLOGY INTEGRATION AND FAILURE

In the United States, the Bill and Melinda Gates Foundation, founded by Microsoft Corporation CEO Bill Gates, announced in 2009, $22 million in new grants to help U.S. schools, districts and state education departments to utilize technology to build better assessment strategies to evaluate teaching and learning outcomes. One such grant was awarded to ACT Inc. and Teach for America to research how teachers affect student achievement and another to the Educational Testing Service to evaluate teacher effectiveness. This $22 million is just a small part of a larger $2 billion investment by the same foundation to "ensure that all students graduate from high school prepared for college and the workplace…" (eSchool News, 2009). Likewise, a report from *eSchool News* noted that Microsoft, Intel and Cisco, among the world's largest ICT corporations, have built a coalition in order to strengthen their impact on global education reform, which develop a set of assessment strategies that "measure 21st-century skills and provide a global framework for excellence … [by underwriting] a multi-sector research project to develop new approaches, methods, and technologies for measuring the success of 21st-century teaching and learning efforts in classrooms around the world" (Stansbury, 2009).

Technology can enrich and support teaching and learning by offering up-to-date, quickly accessed data and information, facilitating interactivity and collaboration amongst students and teachers, and providing tools for greater productivity and efficacy, among other benefits. ICTs can help teachers provide a richer learning environment that fosters student engagement, creativity and knowledge creation that requires higher-order and critical thinking skills. However, there are many barriers to successful ICT integration into classrooms and when there is a failure to incorporate ICTs in instruction, blame for the failure often falls upon teachers. Trade publications and mainstream media and educational institutions easily take up this mantra of blame, claiming that teachers are either unmotivated, poorly educated, resistant to change, or just old-fashioned, while students are self-indulgent, media-savvy pleasure-seekers unwilling or disinterested in learning, and are falling behind their peers internationally, especially in the fields of science, technology, engineering, and math. ICTs in education tend to be glorified as necessary and inevitable for education success, while blaming educators for the lack of ICT incorporation into the schools becomes an easy scapegoat. Critical research that examines the central position that ICTs have come to have in education can help facilitate a clearer perspective on why ubiquitous equitable integration of ICTs in schools has yet to occur and complicates the situation beyond the classroom teacher.

Over the last 20 years, technology integration has been a key issue for districts and schools in western and non-western nations, both in terms of creating infrastructure and making computers available to teachers and students. Some studies claim that infrastructure is 90 percent complete in the United States with schools being equipped with a high level of broadband infrastructure and classroom computers (Parsad & Jones, 2005; Wells & Lewis, 2006; Tapscott, 2009). Despite these supposed gains in infrastructure supported by federal and state technology funding and planning, however, technology has yet to be integrated effectively into the classroom, seamlessly supporting and extending curriculum instruction. According to the International Society for Technology in Education (ISTE), effective technology integration in the curriculum must include implementation of technologies as tools "to enhance the learning in a content area or multidisciplinary setting. Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions—as accessible as all other classroom tools" (International Society for Technology in Education, 2002, p.

3). When this ideal classroom use of technology is not achieved mainstream media and scholars alike assume teachers are at fault.

If the narrative is that ICT infrastructure is in place and ubiquitous access has been achieved in schools, the only barrier to using these tools, it is believed, must be the teachers and their unwillingness to change their own practices and beliefs. Some scholars (Lanahan, 2002) have noted, for example, that while teachers and students use technology frequently in their daily lives, technology is largely used for low-level tasks, not higher-order and critical uses, because teachers do not have the knowledge, ability, or the motivation to use technology to improve and expand their instruction. Others have found (Vavasseur & MacGregor, 2008) teachers' fear of technology as a leading cause preventing effective use of technology or while some (Plair, 2008) have attributed lack of integration to veteran teachers being stuck in their ways -- becoming too comfortable with using tried and true pedagogy. While fear and perhaps reluctance to change are part of the reason some teachers are not using ICTs, other scholars recognize that there are deeper structural and environmental reasons such as: lack of administrative support, whether that be providing physical access or professional development training; lack of planning time; large class sizes that limit what can be done in the small amount of class time available; and most significantly, a debilitating testing culture that constrains teachers (Plair, 2008; Vavasseur, 2006). In several research studies (Chen, 2008; Lim & Chai, 2007) many teachers claimed to want to use technology but felt that rigid daily schedules and syllabi, combined with extensive pressure on testing and performance, limited their ability to get creative and to experiment with technology in their instruction.

Lack of ICT use in the classroom is a complex issue that encompasses both a need for full and equitable infrastructure and ongoing support from a technical standpoint, while also recognizing the need for social inclusion (Warschauer, 2004). In this case, social inclusion involves participation of teachers and students in determining how and why ICTs can and should improve their own educational outcomes. Often funding, programs, and mandates surrounding ICTs in the classroom, while perhaps well-intentioned, are counter-productive because they are driven from the top-down and do not address the immediate needs and realities of the classroom and diverse student community. Research presented here has already shown the socio-economic disparities between educational institutions as well as ICT access and usage. The instructional technology narrative that assumes an unquestioned role of ICTs in education as being critical and inevitable is leading to the oversight of teachers' struggle to succeed in an inherently unequal educational system that reinforces broader socioeconomic divisions. This division is not limited to the United States, nor is the instructional technology narrative.

A COMMON NARRATIVE: GLOBALIZATION AND INTERNATIONAL STANDARDS FOR ICTS IN EDUCATION

Two major rationales examined in this section, for integrating technology into education, include the need to develop "21st-century skills" in students, and second, to prepare students to effectively compete among a growingly competitive and global information age.

With globalization and the information age saturating the narrative surrounding education, schools around the world feel a common pressure to step up their funding and focus on integrating technology, especially in the areas of math, science, and engineering (Kumar, et. al., 2008). Multilateral organizations like the UNESCO, the OECD, and the World Bank, institutions overseen, funded and directed largely by wealthy Western nations, are working towards creating scaled ICT professional development training for teachers and to establish international standards for teacher training, assessment and evaluation. (Davis, et. al., 2009; Morrow & Torres, 2000; Burbules & Torres, 2000; Lingard, 2000). Education is often seen as a route out of poverty for both nations and individuals, and organizations like the OECD are conducting research to "determine what skills, training, and education people worldwide will require to survive and thrive in the knowledge-intensive economies of the twenty-first century" (Suarez-Orozco & Sattin, 2007, p. 26). Technology is at the forefront of what is contributing to the redefinition of education, nationally and globally, and how these technologies can fuel the new global economy (Stromquist, 2002).

While some glorify this international standardization and the role of technology (Tapscott, 2009), others critically examine the causes of such a focus and potential negative outcomes. One of the main critiques of the push towards international standardization of technology and teaching is the increased marriage between public and private institutions and the increased influence that the market has on education policy and funding. Individuals and corporations that invest in ICTs see education as a sizable market both for the ongoing sales and support generated through school demand, and also the extended home market linked by the schools' student demand for goods such as computers, hardware, software, etc. As such it is in the best interest of the technology industry to assure that technologies remain a key focus of schools' success both in terms of infrastructure, teacher training, and student access on a global scale. When schools and teachers are blamed for failure, it provides yet another opportunity for businesses and private interests to step in and provide additional solutions, creating a business model that is welcomed and encouraged, largely by rich nations that support the ICT industries (Stromquist, 2002; Brown, 2006). Stomquist (2002) is also concerned that technology integration along with testing standardization has been coupled with privatization since 1985. Outside of wealthy nations, others are concerned that the role private-public partnerships are taking in helping poor nations and individuals out of poverty, actually work to entrench existing domestic and international economic and social disparities (Burbules & Torres, 2000; Kellner, 2000), especially privileging rich nations and keeping poor ones in a subservient state. In both wealthy and poor countries, there are concerns that focusing on the needs of the market will lead to the exclusion of other key social protections and that corporate involvement in education overall will eventually replace national oversight and accountability to education, such as issues related to the digital divide. One such oversight is the continued digital divide that remains entrenched domestically and internationally (Lauder, et. al., 2006) which privileges certain social sectors with higher degrees of access to and use of technologies for personal and professional uses.

Related to questions of the digital divide, many scholars have come to question the way that ICTs have come to be seen as critical and inevitable in education, noting that in a 'knowledge society' it is assumed that with increased technical skills, every individual and nation will have an even shot at entering the global labor force, when in reality perhaps only 40-50 percent of jobs will require any need for technology skills and that the majority of work will be based in temporary positions (Stromquist, 2002). The role that the technology industry and multilateral organizations play here, they critique, is to privilege high-paying tech-related jobs to rich nations and to a transnational elite population, and to continue to exploit cheap labor pools within developing nations (Kellner, 2000; Morrow & Torres, 2000). In this case, the role of the teacher in the global economy is to produce graduates with competency-based skills at the expense of critical competence that is required for "autonomous learning and active citizenship" (Morrow & Torres, 2000) tracking students either into vocational or professional and academic positions. This can present a challenge to teachers who are charged with imparting content knowledge, along with critical integration of technology, to serve children that come from a variety of social, cultural, and economic realities. Within performance demands, for example, how can they, as professionals, decide when technology is best used or not in their classrooms? Within the structures of school accountability how can they be creative and yet scripted, and how can education be used to help solve problems of poverty and inequities (Lauder, 2006)? In the global 'knowledge' economy influences emanating from outside of the education community are determining what knowledge is and how it is best implemented, with the ICT industries leading the way. It appears as though teachers are being charged with reinventing their curriculum in order to make technology necessary so that the instructional technology narrative and overall business strategies can work more effectively, instead of focusing on how technologies can really make learning and teaching better amongst much broader socio-economic challenges facing education. Instead, the focus should be redirected to examine ways that technologies can be introduced to the classroom to provide an intrinsically valuable support system that does not compromise teacher professionalism. Critical scholarship in development communication provides analysis into such questions related to the rise of ICT's emergence, focus, and potential negative impacts in global education initiatives, and which relate similarly to the challenges faced in U.S. education.

APPRAISING BENEFIT OF ICTS IN EDUCATION: DEVELOPMENT COMMUNICATION, TEACHERS AND EQUITABLE ACCESS

The perceived or real need for incorporating ICTs into all aspects of society has affected how local and national governments, corporations, and international governing bodies and development agencies funnel their money to social development. ICTs include not only hardware and software but also digital text and visual media and the infrastructure necessary to deliver such data. Government focus on ICTs for development in some cases has led to an increased degradation of social, cultural, and environmental support for already poor and marginalized individuals in nations across the globe. This seems surprising given the high credence given to technology to help solve some of society's greatest challenges and highlights the importance of extending such research given the intense focus on technology's role in development.

Development communication research has long examined communication technologies and the information that is transmitted through them to affect social change.

The frameworks or approaches that scholars have taken within this field vary. By examining the four major theoretical models that have guided development communication research including, diffusion of innovation, modernization, participation, and empowerment approaches, we can better understand how ICTs have come to be seen as effecting social change. In so doing, we can employ a critical approach to development that considers how particular assumptions about problems and solutions arise and analyze how these initiatives then relate to the larger focus of considering education as a development project. Often, development initiatives and scholarship addressing the digital divide push for the integration of ICTs for economic development to improve overall living standards of the poor. This is reflective of the modernization approach in development communication scholarship and has potential implications that must be considered.

Social, political, and economic interventions between and among nations for development is a long-standing practice. However, development aid as is known today began after World War II with the development of the United Nations and other bilateral agencies among wealthy nations. It was believed that funneling development aid to poor developing nations could prevent future war from occurring (Melkote & Steeves, 2001). The intent of the development aid was, and continues to be, to modernize and grow economies, bringing greater prosperity and stability. The theoretical orientation surrounding development projects in terms of how and why they are implemented vary. Many early development projects operated under the philosophy that people in developing nations needed to be persuaded to change and improve their ways. It was believed that with the correct messages and training from experts, from donor countries and outside experts, problems of the poor could be addressed. In the 1940s and 50s Everett Roger's (1962, 1983) research model on *diffusion of innovations* began to take root in the United States and was then extended to development projects as a way to influence change. The premise of this model is that initiatives or technological innovations can be communicated via mass media, to persuade thought leaders in a given community of the new idea who then pass along the ideas to others in their sphere of influence, who then adopt the new technological innovation, which then continues to spread. This method is a top-down strategy with outside experts identifying the problems as well as the solutions. This form of development was met with little success; and the disappointing results were not blamed on the process, the decision-makers, or the presumed innovation. Instead, the lack of adoption or success of the innovation were blamed upon the peasantry themselves for being defiant, stubborn, or ignorant. Only they were to blame for their lack of willingness to change and improve their situation. Similar to this approach is the modernization theory of development communication.

Under the modernization approach in development communication, development initiatives focus on a top-down strategy of government or development agency solutions for helping poor individuals improve their living conditions by delivering targeted information or messages geared towards helping nations, communities, or individuals improve their living standards. Ultimately this approach is centered upon a Western-biased ideology, which is framed under conditions of a free market, individual initiative for success or failure, and democratic participation. As a result, the focus of development communication projects involving ICTs emphasizes generation of greater economic productivity to solve social problems, prioritizing economic over social concerns (Wilkins and Waters, 2000). By analyzing 40 ICT-focused development projects, for example, Wilkins and Waters (2000) found that discourse surrounding ICTs for development is mostly concerned with generating greater economic participation and that the role of ICTs in this effort was largely used for linear transmission of information. This reflects the traditional modernization approach, one that does not address the individual, social, political, or cultural contexts of the communities in question, and one that may even discourage more innovative conceptualizations of social change that involve individual and community participation and empowerment in development projects.

Under this approach development communication projects are focused on developing greater physical infrastructure, such as developing a faster, more secure network infrastructure in large cities of developing nations with the intent of helping national governments create a stronger banking system. Another type of initiative might set up a computer lab in a small village in order to provide access to software training on the Microsoft Word suite in order to create a digital literacy for greater job opportunities. Initiatives such as these do not take social inequities under consideration, but rather place an ICT remedy on top of larger, political-economic goals of the national or global economic structure, disregarding the actual needs and interests of the poor. Some argue that if governments of developing nations had more influence over the development of ICTs, or if a coalition of developing nations could create their own ICT industries and network standards, for instance, this would create a more level playing field in global economic competition by creating an alternative political economy (Hedley, 1998; Krishna & Madon, 2003). However, scholars like Mody (2000), Downing (1999), and Main (2001) highlight that in many cases, despite global inequities, the government and business elites of developing nations are in fact benefiting from this modernization-focused approach to global development. While under the guise of supporting the poor and bridging the digital divide, this approach instead reinforces power differentials within both developed and developing nations. The participatory and empowerment approaches, however, aim to steer away from the modernization approach in order to create genuine social change among those in greatest need.

Defining precisely what constitutes a participatory approach to development communication scholarship is as difficult and varied as are conceptualizations of the digital divide. However, this approach was developed as an alternative to the modernization paradigm whose proponents were interested in the idea of working with and sharing information among the development experts and community stakeholders that projects intended to serve. The participatory approach recognizes the need for mutual collaboration by acknowledging the need to embrace the individual's or the community's ability to influence and control certain aspects of their living condition. This perspective stresses that the primary stakeholders, including end users, of a service or project should be involved in the decision-making process from the beginning of the project and with an outside expert working with other project stakeholders to explore and negotiate solutions. Under this approach ICTs might be implemented in the development project through a development agency, like the UN, in cooperation with corporations, local government officials and local non-profit agencies and their patrons. For example, perhaps a public library or community center solicits patron input through focus group interviews to assess patron's needs and interests and it is found that more computers and Internet access is desired. The partnering UN agency might solicit a computer company, like Dell, to donate computers with Microsoft software, which helps them to create brand awareness and loyalty. The partnering governments, wanting to attract ICT-related jobs through a more skilled citizenry, might provide corporate tax incentives for the collaborating corporation, and provide additional funding. Finally, the public library or community center is able to fulfill patron demands and its social mission by providing patrons with accessible digital information.

The key for many participatory development or social inclusion projects involving ICTs is that the project goals, components and participants are largely pre-determined by those in control over the resources and financial support of the project. While the idea may be to integrate technologies into existing social structures to provide greater access and to and opportunities for using ICTs (Hudson, 2006; Warschauer, 2004), simply inviting local individuals to participate in planning meetings or to have a say in certain aspects of the project is not necessarily going to be what it takes to improve their actual living conditions. Although the participatory approach did raise issues of power in terms of providing local access to communication, scholars found that in fact those in charge of the project, or the funding source for the project, did not want to give up power or did not know how to realize the goals of participation in practice versus theory. Additionally, these projects ultimately served the same goals of the modernization approach because the success indicators of the project were still often tied into larger economic development goals and did not address broader social structures of inequity (Melkote & Steeves, 2001; Melkote, 2000; Huesca, 2000).

The empowerment approach to development communication scholarship more closely addresses the need to confront embedded social inequities. Empowerment has been described by Rappaport (1987, p. 121) as “a psychological sense of personal control or influence and a concern with actual social influence, political power, and legal rights. It is a multilevel construct applicable to individual citizens as well as to organizations and neighborhoods; it suggests the study of people in context.” Under this framework, change is initiated and realized through dialogue and grassroots empowerment strategies. Through dialogue, individuals, communities and/or organizations, become aware of systemic social inequities, and recognize the roots of the problem affecting their situation, and work together to find solutions under collective action. In this way, they have control and gain power through their knowledge and action and are not dependent upon outside sources. In this case, ICTs would be used as a mechanism or tool for reaching their desired ends, whether it is to access and research information about exploitative corporate/labor practices in their community, to affirm cultural representation through the production and presentation of local stories, arts, or political agendas on Websites or listserves, to generate local or fair trade practices among other communities using databases and local eCommerce Web sites, or to organize international protests through blogging in support of their goals. In this approach the focus is on the generation of consciousness, the generation of community action, and the close scrutiny of existing power inequities in order to change them.

While each of these approaches to development communication differs in its overarching strategies, and even with the goal of the empowerment approach being to shake up existing structural power inequities, in the end they often remain attached to a broader political-economic system that is responsible for, according to Escobar (1995), constructing the discourse that created the notion of an 'undeveloped 3rd world' in need of the 'Western experts from the developed world' to fix their problems. In truth, the entire field of practice has rarely ended up realizing substantial social change among those in need, but has in fact created greater social inequities by building up a network of global elite that benefit most. The objectives of global capitalism are expansion and privatization. As such, the development 'industry' has always been tied to this larger global initiative, which thrives on structural inequities that support a diverse and stratified labor force and consumer base.

McMichael (2000) ultimately sees globalization as an extension of what he calls the 'development project,' the goals of which are inextricably linked to Western modernization. McMichael describes how following WWII and the end of colonialism, the development project came to legitimize post-colonial rule by providing development aid to so-called developing nations. Since this time, development aid has always been contingent upon the modernized worlds' needs and expectations. For example, international lending institutions and governing bodies have worked to provide aid while forcing deregulation of national industries to integrate developing nations into the ever growing international private sector. McMichael (2000) also notes that while development projects claim to stimulate economic, social, and political growth, the opposite effect has often resulted through the ultimate Western exploitation of developing nations. As private multinational and transnational corporations push to privatize all aspects of social organization, the level of responsibility and support for social initiatives by governments has declined. Likewise, Escobar (1995), notes that to reach development goals set by the 'developed nations' developing nations had to assume loans under specific conditions that required their national economic restructuring model to fit the economic interests of Western nations. As a result, national social programs have often been cut or disregarded to benefit private industry while the poor citizenry has suffered. The global discourse and practice surrounding the focus of integrating ICTs in the development project mirrors this reality. In the guise of helping the poor under the discourse of the global digital divide, the poor are once again marginalized and exploited. When educational institutions are then brought into this discourse, developing nations are forced to focus their efforts and educational strategies on building ICT infrastructures, testing structures, and teacher accountability measures that live up to the standards of international bilateral agencies like UNESCO, the OECD, and the World Bank. Blame for not aligning with these international expectations and objectives is directed to developing nations and ultimately to educators without truly evaluating how ICTs can serve the social and educational needs of developing nations.

What is partly required to begin deconstructing this 'naturalized' discourse surrounding development and ICTs in education is to reveal the power structure behind these initiatives through greater institutional transparency and deconstructing the cultural production of the narrative. This approach works to better clarify motivations and outcomes of such initiatives, including who names the project as necessary, why it is deemed necessary, who ultimately benefits in the short and long-term, as well as what structural changes are intended with implementation of the project. Gandy (1982) explores the concept of information subsidies to explore societal discrepancies in how people access and use information and demonstrates the “vast inequities in the ability of groups and interests within and between classes to control the flow of information” (p. 5). By examining the stakeholders responsible for setting the media agenda and identifying how and why this agenda is established is critical for understanding the impact these decisions have on what is valued as a society and how power over decision-making is established. In education, narratives surrounding ICTs and the digital divide have become widely accepted which works to mask the “…unknown dimensions of source behavior and the structural conditions that facilitate the use of information as an instrument of social control” (p. 9). In the case of education technology Gandy (1982) connects information subsidies in the education sector to the Department of Defense (DOD) which largely drives the economy of the United States. Through government subsidies large sums of research and development monies circulate to businesses, who are responsible for developing innovations for the military. To expand the market impact of these investments, Gandy argues that deliberate subsidies were put into place to transform the education sector to introduce and accommodate an instructional technology marketplace. Through the combination of government incentives to defense-electronic firms and the adaptation of military technologies for use in education government officials and technology producers were able to establish and promote the benefits and required uses of technologies in education as driven by the establishment of federal education bills and policies that required the purchase of instructional technology. This concerted effort was deliberate and was established through education policies in the United States as well as implemented through international global development funding. Gandy (1982) recognizes that "At no stage in this process was the average citizen seen to have any identifiable role" (p. 145). This effort resulted in defense-electronics firms pushing existing technologies, which were developed for specifically for military purposes, into the education space. Instead of innovating and developing technologies for deliberate use in education, and according to the needs of students and teachers, schools were forced to use federal funds to purchase technology in the name of international competition and fighting a War on Poverty; ushering in and establishing a role for defense firms in the education sector. Instead of focusing on the problems facing education and teachers in the classroom, and innovating in that space and for that purpose, the implementation of instructional technology and the purpose for their integration into education was framed within economic terms alone. This expectation to use technologies that may or may not address the problems of the classroom teacher, coupled with instructional technology standards that require a minimum level of infrastructure and ongoing support that is likely absent because the cost of those critical components are not subsidized, sets up the teacher and school for failure.

Acknowledging existing power structures within the development project is the first step towards building toward substantive social change (Wilkins 2000). Scholars such as Melkote (1991) and Escobar (2000) believe that there is still a place for development communication scholarship and the use of ICTs in creating social change, but that the focus and impetus of such projects has to be redirected from the national or global level to the local level, involving a truly participatory model. Ironically, with the ever growing global connectedness of social and economic processes facilitated by ICTs, many international and grassroots movements in fact are operating outside of government, corporate, and development control to improve various global social conditions. Some might consider this type of global activism to represent a true model of the empowerment approach to development. Theories of globalization provide a different paradigm for thinking about how media and ICTs affect social change. While there is no coherent theoretical agreement of what constitutes globalization, there is basic understanding that it involves global interconnectedness largely driven by capitalist economic goals and facilitated through ICTs. Sparks (2008) notes that, "Alongside this claim about economic shifts from physical production to symbolic production, and very often overlapping with it, is the claim that the enabling powers of technological advances, notably in the fields of computing and telecommunications, which have been particularly influential in media and communication, are what makes the global epoch possible…It is certainly the case that the financial markets that exercise such immense sway over the destinies of whole economies and the lives of millions of people are pre-eminently symbolic exchanges" (p. 133-134). These symbolic exchanges span social, political, cultural, and economic realms in complex and varied ways. This global interconnectedness can work to influence a global consciousness or expectation of why and how things operate from a business perspective, amongst stakeholders in a given field. This is evident, for example, in education where expectations towards teacher and student standards of accountability are becoming more important and more alike across nation-states.

With early development communication theory the focus of development was to expand economic potential between nation-states. Globalization complicates this quest for economic growth to include a variety of dispersed stakeholders including nations-states, transnational corporations, and businesses who are rethinking divisions of labor and taking advantage of efficiencies and cost-savings that globalization facilitates. The knowledge workers who engage with ICTs to accomplish their jobs also participate and contribute to, and benefit from, the *global network society* (Castells, 1996, 1997, 1998). ICTs have facilitated a dispersion of power in that power is no longer concentrated under the nation-state. Instead, global information networks reconfigure power bases into what Sassen (2001) calls global cities, or what Castells (2011) would refer to as nodes in the global networked society. Instead of dispersing wealth and raising the overall standard of living for the world's population, Castells (1998) is concerned that individuals and nation-states not able to participate in the networked society, as is reflected by lack of ICT accessibility and usage among and within nation-states globally, these outliers will become further marginalized deepening socio-economic divides; concentrating wealth amongst the worlds' elite class and knowledge-workers.

The relationship between globalization and ICTs affects education and education affects development. While ICTs have, and continue to, improve many aspects of teaching and learning many individuals and schools have never realized their benefit. During the age of information and globalization it remains critical that educators, policymakers and development agencies participate in this process with an eye towards the ultimate goal of facilitating quality working conditions for teachers and learning opportunities for students, in ways that are meaningful to their own needs and experiences. If the goal for expanding globalization of ICTs in education is to pave ways to improve living standards and working opportunity for the worlds' most poor in the information age, then the focus must remain first on providing equitable access, and second, empowering teachers and students at the local level to contextualize meaningful and purposeful uses and expectations for ICTs. Whether this focus is to build a more equitable global technological infrastructure or to redirect the discourse of the digital divide to include development of local leadership and teacher leaders, the key is to understand how ICTs can be used as a means to an end and not be the end goal.

National and global education initiatives and development and ICT industries may operate under good intent, but ICT integration must be purposefully and thoughtfully approached. The intent, for example, should be first and foremost on creating equitable standards for ICT integration and ongoing support, and teacher leaders should be at the heart of this demand. Without infrastructure and technological barriers in place, school leaders can help support teachers and students at the classroom level focusing on specific challenges and fostering ongoing success. The current discourse surrounding the need for technology in education is largely to increase student skill in order to ensure greater individual economic success in the information age, and internationally to attract businesses to countries as a result of their skilled citizenry. While these factors are important to consider for development they belie the fact that for most marginalized individuals in the U.S., and internationally, the global economic market and the narrative being facilitated by the ICT cultural is ultimately what continues to work against them, relegating them to the margins of global society. Only until the focus surrounding ICTs is on developing ongoing equitable access and support and using the educational institution as a means to empower individuals through critical thinking and leadership capacity, will we begin to address core social problems that plague us. It is the combination of exploring socio-economic disparity, teacher and student empowerment, ICT infrastructure, and the international instructional technology narrative that drives the intent behind this research.

New solutions that include social inclusion to foster equitable access and use of ICTs in education in the United States and internationally to improve society must be sought. Because the issues of equitable access to, and use of ICTs in education are complex and far reaching research must begin to focus on the evolution of ICTs in education including narratives surrounding ICTs in education and the stakeholders that contribute to this narrative. By examining this space we can deconstruct assumptions in the narrative that prevent a more critical analysis and creative solutions that can foster true equity in access, use and opportunity for social inclusion. The case study research presented here addresses these issues by focusing on the historical evolution of one of the central ICT stakeholders contributing to the production of the ICT culture, a nonprofit education technology organization called the International Society for Technology in Education (ISTE), led by and for computer-using educators. This organization is responsible for creating the widely accepted national education technology standards adopted by each state in the United States in addition to serving as a foundation for the development of the international ICT standardization effort led by UNESCO. The intent of the nonprofit sector is to operate within the space not served adequately by the government and private sector. It is in this space that we can begin to analyze the production of the instructional technology narrative and surrounding culture and how various stakeholders engage with one another to reach a common end goal. Understanding the narratives produced by these stakeholders provides clarity into the expectations that surround ICTs in education in the United States and internationally. It also allows for a deeper understanding of how ICTs in education have evolved and grown to such prominence, and, more importantly, opens the narrative space to explore new solutions for addressing socio-economic divisions and to build teacher leadership to facilitate greater social change and equity through the use of ICTs in education.

When we analyze information related to ISTE's historical documents and interviews with key leadership against critical theories of the digital divide, cultural production, ICTs and education, and development communication, we can better understand how education has fallen into a perpetual losing battle of trying to integrate broad educational reform, that incorporates ICTs as part of the solution to the challenges of the information age, but remaining stuck in established socio-political divides that ultimately work against student and teacher success. It is not a question about whether technology is necessary or important for improved educational opportunities; rather, it is a question of prioritizing needs and effectiveness of how and why these technologies are applied to the education system nationally and internationally. ISTE has played a key role in shaping expectations for national and international standards of technology in education. It has also developed a cadre of international affiliates and stakeholder partners to develop international expectations for how and why technology can benefit a diverse array of national education systems in a variety of contexts. Through international private and public partnerships and initiatives, ISTE continues to impact the role of technology internationally in education. My research examines both how the narrative around technology for education has evolved from within the ISTE membership, and how the influences of the broader stakeholder narratives have been crafted through the instructional technology culture. Through this case study research, I examine both the real and potential repercussions that this stakeholder narrative has for equity in ICT access and use internationally.

Chapter Three: Methodology

The purpose of this research is to better understand the ways in which Information and Communication Technologies (ICTs) have become an integral component of education. By framing this study within the scholarship of the digital divide, education technology research, and development communication, I explore the diverse influences that have helped evolve the role of ICTs in education. This study explores how ICTs have become socially, politically, and economically prioritized in education globally through stakeholder narratives surrounding instructional technology. This exploratory research focuses on an institutional case study of the International Society for Technology in Education (ISTE). The two broad research questions that drive this study are: *What factors contribute to the creation of expectations, via standards, of technology in education?;* and, *How has discourse related to ICTs in education changed over time?* To gain organizational knowledge about ISTE and the evolution of ICTs in education, as well as the social, economic, and political factors that influence the organization's mission, goals, and directives, I implemented two qualitative research methods: semi-structured interviews and archival analysis. The methods and data sources were used to support the following three intermediary research questions that guide this study.

INTERMEDIARY RESEARCH QUESTIONS

This exploratory research builds on an institutional case study of the International Society for Technology in Education (ISTE). This case study is grounded in theory related to education and ICT integration, production of culture and culture of production, the digital divide, globalization, and ICTs in development communication. The first broad research question that drives this study is: *What factors contribute to the creation of expectations, via standards, of technology in education?* Following are the intermediary research questions that shaped the design of my case study to address this question:

1. **How has ISTE established technology standards for education?**
    a. What process has ISTE followed to establish technology standards?
    b. What has impacted change in standards since the initial standards were established?
    c. Which industry, government, and individual actors have contributed to the establishment of ISTE technology standards and in what ways?

2. **In what ways have technology standards and expectations of technology in education been facilitated by ISTE internationally?**

The data sources used to inform these intermediary questions were five semi-structured interviews conducted with ISTE organizational leadership and content analysis of ISTE archives, including organizational mission statements, staff and board reports, strategic planning documents, and board and staff meeting minutes.

This research also addresses the second key broad research question: *In what ways has institutional discourse of ICTs in formal education changed over time?,* with the following intermediary question: *How has ISTE's discourse, related to ICTs in education, been framed since its founding in 1979?* The data sources used to inform this research question were based in content analysis of ISTE-produced teacher-member magazine issues from 1974 to 2011.

These questions were framed within a critical approach to researching technology's role in education—namely, analyzing the stakeholders and the role that stakeholder narratives play in shaping the importance of ICTs in society. This approach is useful for understanding if and how we can better direct organizational, policy, and overall social development efforts of ICT integration into education to address broader socioeconomic divides and key needs of teachers. To gain in-depth organizational knowledge about ISTE, its approach toward framing the narrative surrounding ICTs in education, and its interaction with other stakeholders, I implemented two qualitative research method:; semi-structured interviews and content analysis. The semi-structured interviews were conducted with the organizational leadership of ISTE. The content analysis was grounded in historical and contemporary organizational data from ISTE. The information collected through these combined methods will add strength to the data that Yates (2004) explains assists in "[embracing] an enormously rich spectrum of cultural and social artifacts" (p. 149).

These combined methods will provide insight into how organizational leadership understands their own influence and the external organizational influences over decision-making, and will also provide historical organizational context to the data. As noted by Denzin and Lincoln (2005), such qualitative research provides a basis for understanding the way in which social experiences are created and interpreted. Through the combined data of interviews and content analysis, there will also be the added benefit of assessing information from multiple sources, which, according to Yin (1994), provides researchers the ability to examine data from a variety of viewpoints and timeframes. For case study research, this type of inquiry is helpful (Stake, 2005; Yin, 1994), especially because qualitative research requires a more inductive approach, which contrasts with more quantitative methods where "hypotheses usually are set a priori and then deductively tested with the collected data" (Locke et. al.; 2007, p. 99). This research design is therefore based on the flexibility that the case study and multiple data collection techniques allow.

My case study is bounded by the organization of ISTE and the factors that influence the mission of the organization and the direction of its goals and priorities. I explore how ICTs have become prioritized in education as well as how the role of ICTs in education has evolved since the late 1970s. I selected this timeframe because it is when technology began to surface in public schools and subsequently when the organization of ISTE was formed. I examined several data sources related to ISTE, including organizational mission, individual and leadership agency, relationships with external stakeholders, historical content analysis, and the development of the ISTE instructional technology standards.

Selecting ISTE to examine these issues is purposive (Babbie, 2004). ISTE is the largest nonprofit organization dedicated to promoting technology in education and is well known for its development of the National Education Technology Standards for teachers, students, and administrators. These standards have been endorsed by the federal government and adopted by each state in the United States and many countries internationally. These standards were also used by UNESCO and their stakeholder partners as the benchmark from which to develop the international ICT competency standards for teachers. As a nonprofit with annual revenue of over $14 million and a strong national advocacy network in place, ISTE is able to collaborate with a diverse stakeholder group representing private and public interests and can influence international, national, state, and local education policies and education technology standards. ISTE is a nonprofit membership-based organization composed largely of computer-using educators and ICT-supporters and is driven by a variety of social, economic, and political factors. ISTE has existed for more than thirty years and, as a result, reflects and represents perspective into the evolution of technology in education as well as the societal importance that technology has assumed internationally. By examining ISTE through its historical documents and through interviews with key leadership, important insight has been gained into the inner workings of the organization and the perspectives of organizational and board leadership. This insight provides a framework for understanding the ways in which technology narratives have been framed and also reveals the stakeholders that have worked to influence the importance placed on technology.

DATA COLLECTION AND INSTRUMENTS

My research design incorporates qualitative data collection methods, including semi-structured interviews with ISTE leadership and in-depth archival analysis of ISTE-related historical documents. Through purposive selection, and snowball sampling I secured the informants for my interviews. I provided flexibility in the questions I posed to enable informants the opportunity to respond with additional information that helped to inform my research goals. I categorized findings from these interviews and compared them against the ISTE organizational archival materials. To inform my research questions related both to the mission of ISTE as well as the evolution of ISTE's narratives related to ICTs in education, I analyzed how ISTE organization and board leadership envision the following: mission and purpose, membership, role of ICTs in education, organizational activities and goals, stakeholder collaboration, role and development process for establishing educational technology standards, and organizational planning.

ISTE has a comprehensive archive in their Eugene, Oregon office that houses historical documents including staff meeting and board minutes, planning documents, conference materials, and publications from the time the organization was founded through the present. The organization was gracious enough to invite me to spend a full week in the ISTE offices to research the archives, take extensive notes, and copy, scan and save documents. I was given full access to the archive and was welcomed to communicate with ISTE staff through informal conversations and formal interviews. From this archive, for this research, I selected teacher member journals, samples of board and staff meeting minutes from each year between 1979 and 2011, organizational strategic planning documents, pre-assembled archived resources surrounding the development of the NETS standards-- including grant applications and reports and meeting minutes—and website resources. These resources provided historical context for how ISTE constructed narratives surrounding ICTs in education. This context was then compared to interview findings and analyzed against research related to ICTs in education, the digital divide, cultural production/production of culture, and education and

ICTs in development communication. A copy of my interview schedule is attached in Appendix I.

To address the second research question evaluating the evolution of ISTE's narrative surrounding ICTs in education, I obtained ISTE-published teacher member journals through stratified, systematic sampling, beginning with the first published journal. I selected two or three member journals from each year from the ISTE archive representative of the years between 1974 and 2011. Not every journal published was in the archive, but the majority of them were available. ISTE organized the journals by the year of publication. The first issue was published in 1974 and began as the *Oregon Computing Teacher*, which then became *The Computing Teacher*, and evolved into the current member journal *Learning and Leading (L&L) with Technology*. I attempted to select one random issue from the spring and one from the fall of each year and if a special issue was available I would select that as well. The research focus of these journals was on the editorial commentary found at the beginning of each publication. This editorial was consistently published by the same editor, the original founder of ISTE, from the beginning of the journal until retirement in September, 2001. After this time, the editorial section was renamed to "In This Issue," and focused less on general perspectives and insight into ICTs in education and instead provided a contextualized overview of all articles found in each publication. In all cases, the editorial and overview sections were contributed by ISTE staff and provided insight into the organizational perspective of the topics discussed within the journals as well as broader issues facing ICTs in education.

DATA ANALYSIS

After receiving the consent of by each informant, I digitally recorded and transcribed each interview. This data, in addition to materials collected for content analysis, was organized according to thematic issues that emerged during analysis: organizational mission and vision, policy and advocacy, standards and accreditation, membership, administrative logistics and use of technology, international purpose, organizational image and purpose, financial focus, and stakeholder involvement (corporate, government, education, nonprofit). These themes helped to organize collected data related to my first broad research question exploring what factors contributed to the creation of expectations, via standards, of technology in education, and the intermediary research questions that support it:

1. How has ISTE established technology standards for education?
   a. What process has ISTE followed to establish technology standards?
   b. What has impacted change in standards since the initial standards were established?
   c. Which industry, government, and individual actors have contributed to the establishment of ISTE technology standards and in what ways?

2. In what ways have technology standards and expectations of technology in education been facilitated by ISTE internationally?

The second broad research question explores the ways in which institutional discourse of ICTs in formal education has changed over time and is linked to the intermediary question of how ISTE's discourse, related to ICTs in education, has been framed since its founding in 1979. The following themes organized the data collected to address this question through content analysis of the ISTE member journals from 1974 to 2011.

- Rationale behind and role of technology in education
- Technology and structural change in education
- Requirements for integrating technology in education
- Barriers to integrating technology in education
- Role of the teacher
- Goals of learning outcomes for students

HUMAN SUBJECTS RESEARCH AND INSTITUTIONAL REVIEW BOARD (IRB)

Any study that involves human subjects requires great care to ensure that the rights of research participants are protected. For this research project, I followed a standard code of ethics while conducting interviews with ISTE organizational leadership. Interview subjects were informed of the nature and intent of my research and were asked to participate in a voluntary fashion. As per the IRB approval, written consent was not required and participation in the interview was considered to be approved consent. The interviews were conducted in a professional manor and followed a semi-structured format. I recorded each interview and requested permission from each subject before using the digital audio recorder. Informant confidentiality was maintained as much as possible given the small size and limited staff roles in the organization.

STUDY LIMITATIONS

Employing qualitative methods for this research is suitable because this type of research examines social processes over a period of time as well as attitudes and behaviors that are difficult to observe through quantitative methods. However, there are certain limitations presented in this research, namely that it is limited to only one case study. This single study does not result in strong reliability or the ability to generalize the findings. However, my goal in conducting this case study is to better understand how the attitudes and practices related to this particular organization can provide insight into the ways technology has evolved into being seen as an essential component to education.

Another limitation to my research relates to the data collection methods. In an effort to strengthen the validity of my findings, my research design uses two data collection methods: semi-structured interviews and content analysis. The field research design and data collection methods provide a “powerful technique for gaining insights into the nature of human affairs in all their rich complexity” (Babbie, 2004, p. 307). As such, the targeted focus and insightful information provided by the interviews coupled with the stable, unobtrusive, exact, and long-range materials provided by the organizational documentation and archival records provide greater validity for the study. However, a potential for bias exists in both collection techniques. For the interviews, this bias could be presented in the instrument design as well as in the interviewee’s responses to questions and the potential reflexivity of the interviewee. For the content analysis, bias could be presented either in the selectivity or accessibility of the documents and archives made available to the researcher. All these factors work to decrease the reliability of the study (Babbie, 2004; Yin, 1994). To help balance the potential of bias, the evidence provided by the documents for the content analysis were compared to the evidence provided by the interviews with organizational leadership. This comparison helped to corroborate the data and allowed for identified themes to emerge during the analysis process.

Chapter Four: Analysis

SECTION I: PRODUCING A CULTURE OF EDUCATION TECHNOLOGY

In this chapter I examine the research data collected which addresses the key research questions driving this study. Through inductive reasoning, themes and categories emerged during analysis of the data which are organized in the following sections. Section I, Producing a Culture of Education Technology, examines the organizational case study data of the International Society for Technology in Education (ISTE) related to standards development. It describes ISTE's role as a key stakeholder in the evolution of the National Education Technology Standards (NETS). To understand ISTE's role and the rationale behind the process, I describe how the data reflects ISTE's organizational identity and the influences of the non-profit structure, internal and external organizational identity, and the framing of the digital divide; all of which serve to support the rationale behind the NETS development effort. Section II, ISTE: Producing National Education Technology Standards, outlines the history and the development process surrounding the (NETS) in addition to the factors that influenced a revision of the initial standards to meet the needs of the digital age. Section III: Putting the "I" in International explores ISTE's involvement in internationalizing the production of education technology culture through international consulting and collaboration for standards development in addition to their involvement in working with the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to design the international competency standards for teachers. Lastly, Section IV: Framing Instructional Technology in Education outlines data analyzed from ISTE-published member journals which provides insight into how ICTs have been conceptualized in education through the organization since the late 1970s; including the rationale behind the role of technology in education, required technological and structural changes in education to accommodate ICTs, and barriers preventing technology integration in education.

Introduction

Education standards can be high-stakes endeavors for teachers, students, and administrators alike. Each educator and student is judged against a variety of standards, which are assessed through mandatory state testing. These results demonstrate competency and mastery over the knowledge and skills deemed necessary by various stakeholders in education. Standards are important because they create a set of shared expectations; provide a benchmark for setting personal, organizational, or national and international goals; and allow for the judgment of and accountability for value, worth, and success.

In education, standards serve different purposes for various stakeholders in the field. For students, education standards state why an education is necessary. The standards establish the knowledge and skills that are required, and at what level of aptitude. Those standards also help students prepare for a rich life, whether that involves personal satisfaction; graduating from high school; getting into a vocational, two-year, or four-year institution of higher education; or getting a job in an ever-growing international and competitive marketplace. Students are tested against a set of learning standards and assessments so that they can graduate through the different levels of education and receive a diploma that demonstrates certain mastery over those standards.

For teachers, standards establish a minimum level of professionalism and expectations about what course content should be covered and assessed, when, and in what ways. Ideally, standards help teachers plan quality curriculum, focus on important information, and assess their teaching and their students' learning. In practice, standards can restrict teachers' creativity, style, or teaching philosophy. Standards and assessments can also have a material impact on teachers; they are the criteria that help determine a teacher's value, success, and salary.

For administrators, standards provide benchmarks by which to judge the quality of their teaching staff and the educational success of their students. Standardized assessments can impact federal and state funding opportunities as well as determine the ability for schools to continue operations. For example, various states have rating systems that determine whether schools are performing in an exemplary way or if they need to be shut down because of consistent low-performance. Although many people in educational, social, and political sectors could—and do—argue the merits of standards in education, the fact is that standards are an institutionalized practice. Having curriculum standards creates a common anchor for students, teachers, administrators, and businesses to align their efforts and try to measure educational success.

Technology standards are one way that states, schools, and districts can set expectations and benchmarks for selecting, funding, assessing, and using technology in the classroom. Standards are inextricably linked to the same rationale for technology as they are for curriculum: They help prepare students to face the challenges they will encounter when they graduate and enter the global competitive marketplace. Students must be prepared to use and select digital resources and Information Communication Technologies (ICTs) as part of their learning experiences. To communicate information effectively, teachers must be trained to know how to prepare students and themselves for the selection and use of technology for instruction and professional efficacy. Administrators must make quick, smart decisions about how to use limited funds to select the best and most useful technologies for improved student learning and teacher instruction.

This research explores the process and development that went into the creation of the education technology standards in the United States and the impact this development has had internationally. The goal of this research is to gain insight into how this process contributes to the steady growth of the technological evolution in schools. Further, it examines how this process contributes to popular discourse that supports the inevitability of digital resources and ICTs serving as indispensable components of a high-quality twenty-first-century education geared towards fostering success in the digital age. How has technology gained such financial, political, and social prominence in education while the needs and challenges facing education in general, and technology integration in schools specifically, have not significantly improved? Because standards provide a commonly accepted benchmark for required knowledge and skills in any given curriculum area, and because technology is a required component for education, this section will address my initial research question, *What factors contribute to the creation* *of expectations, via standards, of technology in education?* I focus my case study research on the nonprofit organization, the International Society for Technology in Education (ISTE). This organization is recognized for developing the National Education Technology Standards (NETS) for students, teachers, and administrators, which have been approved by the federal government and adopted or adapted by the majority of U.S. state governments and some international education ministries. By examining the factors and various stakeholders in ISTE's development of these standards, we can gain insight into the broader story of technology's rise in importance in education in the United States and globally.

The Rise of Technology in Education

Many political, economic, social, and cultural factors have contributed to the prominence of technology in the education sector since the late 1970s. Many educators are self-professed technology advocates, and most schools foster professionalism of instructional technology by hiring individuals and teams of staff to help teachers gain technological skills and methods for teaching with technology. These positions, along with instructional technology professional development training, evolved and became institutionalized as state and federal funds were made available to schools and districts. Such funding allocation is often stipulated on schools and districts enforcing a required set of technology standards and by evaluating the integration of these standards. The political influence over technology standards has been wielded largely through accessibility to these state and federal grant funds. The funds support technology infrastructure as well as hardware, software, and professional development training for teachers. Additionally, states adopt technology standards that serve as benchmarks from which to judge successful integration of technology for teaching and learning.

In addition to political influence, other factors contribute to integration of technology in education. Scholars such as Watkins (2009) and Prensky (2010), for example, have examined the effects and expectations that students, who have grown up using technology for learning or pleasure, have for being able to access and use technology in the classroom. Instead of forcing students to ”power down” in the classroom, many students, parents, and technology advocates are pushing teachers and administrators to integrate digital resources and ICTs into daily instruction, believing that doing so will better engage students in the learning process, make learning more relevant, and ultimately help broaden students’ college and career opportunities. The appeal of technology also relates to new expectations that some have regarding the role of education itself: moving from a factory-like form of education to a more interactive, inquiry-based education that, through the use of technology, makes learning more real and participatory for students (Collins & Halverson, 2009). The argument is that if ICTs can improve effectiveness and efficiencies, as they have in other sectors of society, the same gains in education should be within reach from both an administrative and a pedagogical standpoint (Warschauer, 2011).

Others (Oblinger & Oblinger, 2005; McLeod & Lehmann, 2012) recognize a deeper physiological impact that technology has on the students themselves, arguing that young peoples’ brains function differently now than in the past, as a result of their exposure to multiple technologies, digital resources, and social networking tools, and that their brains demand different and faster processing with multiple simultaneous inputs. As a result of these physical and social changes in how students access, process, and communicate information, it is argued that teachers, students, and administrators must rethink education and integrate technology more fully into how teachers teach and learners learn. There are many clear examples showing how technology and digital resources can provide engaging, interesting, and interactive learning experiences for students as well as teachers. Used in meaningful and purposeful ways, technology and online learning opportunities can help engage students, improve pedagogy, and create administrative efficiencies (Lei and Gupta, 2010). There are many different stakeholders interested in seeing technology infused throughout education; from private business and nonprofit organizations, to government, parents, and students. Both benefits and drawbacks exist in suffusing technology into the field of education.

Scholars such as Monahan (2005) have explored the political economic implications of integrating technology into education, arguing that education has become a profitable key market for capitalism's latest economic technology boon. In this case, success in education does not rely on technology. Instead, focusing scarce funding and time towards technology integration actually creates an unnecessary burden for teachers and administrators. Similarly, some scholars have investigated how top-down decision making in ICT-related development projects tends only to serve those decision-makers and have less impact on the actual end-users (Mody, 2000; Downing, 1999; Main, 2001). For some educators, adding expectations for integrating technology can be an additional burden when many teachers are trying to deal with more immediate, serious, and challenging social issues that affect quality education: students coming to class malnourished, students' behavioral challenges, and the overall lack of student school preparedness. In addition to these challenges, the digital divide continues to create social, economic, and political gaps within and among nations as individuals and institutions grapple with ever-evolving and costly broadband infrastructure challenges and varying levels of digital literacy and digital relevancy.

Among the research, opinions, and debates are the education technology standards that have served as a benchmark for educators and administrators and the many stakeholders in education. Why did the standards for technology in education emerge, under what conditions, and who was responsible for their creation? The widespread emergence of technology in education is a slow but steady process that began in the late 1970s when personal computing became more accessible to the consumer market. Interest increased as more affordable innovations in hardware and software came about and computer networking began to emerge outside of research and government institutions. Education technology advocates also started to make a concerted effort to promote technology use in education. These concerted efforts evolved alongside several different education technology groups, but the nonprofit organization responsible for having developed the widely recognized National Education Technology Standards (NETS) was the International Society for Technology in Education (ISTE).

ISTE created a set of expectations—standards—for why technology in education is critical and how technology is most effectively used by students, teachers, and administrators. What began with the commitment of a handful of individuals eventually led to a widespread collaboration among various stakeholders to develop and disseminate the National Educational Technology Standards (NETS). How does a process like this evolve, who contributes, and who does not? What factors contribute to the process, and as the first broad research question to this study states, W*hat factors contribute to the creation of expectations, via standards, of technology in education?* I explore the answer to this question by analyzing data collected from ISTE's archives, including board and staff minutes, the standards development archive, and interviews with ISTE staff.

Producing Education Technology Standards

Technology and education are often synonymous with the terms *twenty-first—century learning* and *the digital age* when it comes to education funding, proposals, grants, and contemporary scholarly research in education. A set of commonly held assumptions, or a culture of education technology, exists among certain education stakeholders; these assumptions support the integration and proliferation of technology in education. Some of these assumptions are laid out by ISTE in early documentation of the technology standards development process,[6] which state that Information Communication Technologies (ICTs) are central to academic and professional success, that ICTs are central to ensuring an informed and engaged citizenry, and that technology

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6 ISTE's basic assumptions are outlined in an early handout draft intended for grant and accreditation proposals titled, "National Standards for Technology in Teaching and Learning: ISTE Accreditation and Standards Committee." The assumptions listed here were excerpted from the section titled, "New Learning Environments for the 21st Century: Technology Standards for K-12 Education." No specific dates are associated with this document, but it is noted that the material was created for a handout to gain support for development of technology standards between 1990 and 1996.

is the main device that facilitates sharing and communicating information. Some additional assumptions, or cultural identities, which anchor ISTE's early rationale for developing standards around education technology in schools are that these standards benefit all the major education stakeholders—from teachers and students to industry and government. Listed here are the stakeholder benefits, as quoted from an ISTE handout (p. 6):

- Parents, communities, and policy-makers can measure success of their schools.
- Educators can accurately predict technology expertise of learners at various stages of their schooling.
- Employers can accurately predict technology expertise of employees.
- Providers of goods and services can more precisely tailor their offerings and delivery systems to a technology-literate consumer base.

From the same handout, the specific benefit identified for students is that having a list of requisite knowledge and skills allows for a richer learning experience, where acquisition of these knowledge and skills are "best achieved in a school setting when initial exposure is in relevant and meaningful contexts, viewed as important by the learner, when use and application of the knowledge and skills are assimilated across learning and life experiences, and when authentic use of knowledge and skills is modeled for the learner. Achievement benchmarks and performance guidelines are effective aids in fostering desired growth in knowledge and skills" (p. 6). For administrators, having quality standards allows them to seek state, federal, and corporate funding and to justify these tools and expenses as part of the overall district and campus strategy and budget. Much of the ISTE documentation related to the development of their national technology standards relates to these basic assumptions and the cultural identity that surrounds education technology and the need for technology standards. The handout further states,

> We believe these standards outlining what elementary and secondary students should know about and be able to do with technology are critical to providing educators, students, and the public a vision of a technologically literate citizen. Technology planners are encouraged to use these competencies as a target as they plan for infrastructure and program development. The well-educated student of our nation’s schools will be technologically literate and the standards developed must define that technologically literate citizen (p. 8).

A different one-page handout produced by ISTE[7] and geared towards parents and teachers lists a series of key things students need to be able to do for academic and professional success. This list is followed by the statement, “Although these essential learnings are not specifically technology skills nor knowledges, technology can be used quite effectively to address them. Teachers have found the wise use of technology can enrich classroom environments and shape strategies for achieving these marketable skills.” Likewise, while conducting research and interviews in the ISTE offices, I came upon a set of posters that had been recently displayed at a conference. One showed an image of children facing the sky and read, “Living in a digital world: the importance of technology is indisputable” with a tagline at the bottom stating, “istenets: The standards for learning, leading, and teaching in the digital age.” This sense of inevitableness and the natural, mandatory connection between education and technology is evident in several key data points. For example, board minutes noting strategic and business planning

[7] One-page handout found in the ISTE standards archive titled, “What Do We Want Our Kids to Know and Be Able to Do?”

efforts[8] and board notes reporting on staff and key organizational issues through 2011 identify key areas of concern that involve reflection on how activities and efforts link to organizational mission, vision, and goals. Each of these is anchored in the advancement of instructional technology through advocacy and strategic partnerships, membership growth, and training and services. The focus in board reports and staff and board activity is on financial growth and membership reach with resources and services. This focus on growth and reach, anchored in the inevitable nature of technology in education, is evident in these board notes from 1990 on. When the NETS were revised in 2006, the board notes begin to reflect a concerted effort to expand this same focus and effort internationally. This belief that technology use is beneficial, that it will continue to proliferate in education, and that schools, government, and international agencies need leadership to facilitate the effective integration and use of technology for education is an identity that ISTE fostered from the start. This conceptualization is also reflected in the ISTE member journal editorials, evaluated from 1979 through 2011. The language that surrounds advocacy for technology in education is a commonly told story, a production of culture surrounding education technology that is cycled and recycled among education stakeholders including government, business, and education sectors.

[8] The first strategic planning effort noted in my research began in 1990 when ICCE merged with IACE to create ISTE as an organization and the first business plan drafts were created in 1997-1998 as ISTE moved to hire a CEO for the organization and develop a lobbying office in Washington, D.C. In subsequent years, strategic board and staff initiatives are reported from each board meeting, all of which are responses to fulfilling organizational mission, vision, and goals. International expansion becomes more formalized after the NETS are revised in 2006 and by 2010 and 2011 board notes reflect ISTE’s goal for international growth in integrating technology into education.

I contend that the creation of the education technology standards is a part of, and has also contributed to, the production of an education technology culture. It is difficult to pin down where or how the development of this education technology culture began specifically, but it is fairly clear to see how it is perpetuated in society. Stakeholders in education technology work within a common set of assumptions about why technology matters in schools and have an undeniable expectation that links education success to technology. Individuals and groups that are a part of the education technology culture identify with common narratives such as what it means to be a twenty-first-century learner and a digital native, learning and working in the digital age. Stakeholder groups contribute to the production of this culture by establishing narratives through various means. For example, government creates policy and funding opportunities to support education technology. Organizations, like ISTE, apply for those funds incorporating narratives that surround the education technology culture, such as the ability for technology to engage students in learning, to meet the needs of digital natives, or to bridge the digital divide. By applying for these funds, organizations and school districts perpetuate the production of the culture by recycling and rationalizing the need for technology in education. Likewise, businesses that create education technology resources and services produce narratives around their solutions that are marketed to government and education stakeholders who begin adopting and recycling those narratives. Each stakeholder group committed to education technology creates narratives or reuses existing narratives to perpetuate assumptions and justifications that serve as anchors to the production of their education technology culture.

Through the National Education Technology Standards (NETS) and the standards development process, along with the production of resources and services, ISTE contributes to this narrative of education technology culture. The commonly held expectations, assumptions, and narratives for technology's role in society and education among the education technology culture have been produced, and are neither inevitable nor natural. It is the *process* that contributes to the production of culture and the culture of production that grounds this research. Du Gay (1997a) states that "all social practices are meaningful practices, they are all fundamentally cultural. In order to conduct a social practice we need to give it a certain meaning, have a conception of it, be able to think meaningfully about it. The production of social meanings is therefore a necessary precondition for the functioning of all social practices and an account of the cultural conditions of social practices must form part of the sociological explanation of how they work. Cultural description and analysis is therefore increasingly crucial to the production of sociological knowledge" (p. 2).

ISTE, the creation of the NETS, and the NETS development process is a cultural process grounded in a similar circuit of production that Du Gay examines in his case study of the production of culture (1997b) and the cultural development of the Sony Walkman (1997a). To contribute to the narrative and production of education technology culture, I see ISTE working to establish an internal cultural identity, linked to nonprofit, grassroots, mission-oriented activities; external relationships that are linked to internal identity; and justification to engage with both internal and external issues by addressing the digital divide. To explore the cultural process of ISTE's conceptualization of education technology through the NETS, I examine the first set of research questions by exploring the history, stakeholder representation, development process, derivative products, and evolution of the standards.

Research Question 1: How has ISTE established technology standards for education?

a. **What process has ISTE followed to establish technology standards?**
b. **What has impacted change in standards since the initial standards were established?**
c. **Which industry, government, and individual actors have contributed to the establishment of ISTE technology standards and in what ways?**

The connection between technology and a high-quality twenty-first-century education is commonly accepted in education technology culture and is a narrative shared among various education stakeholders and the popular press. Because the National Education Technology Standards (NETS) developed by ISTE are a part of this discourse, examining the process that went into their creation will help us to understand the NETS as a cultural object and not a naturalized and inevitable process. The NETS have been and continue to be produced within a particular organizational culture, linked to a broader education technology culture, in an evolutionary process that is complex not linear, dynamic not static; this process has overlapping dimensions of production that involve a variety of stakeholders, processes, and outcomes. The results have led to some potentially unexpected outcomes of consumption, largely being their international appeal. The education technology culture is not bound by geography and, in fact, is prolific internationally. What began as a very national project, creating *national* education technology standards, has now evolved into an international consulting business that helps ISTE, and other education technology stakeholders, perpetuate the narratives that surround education technology culture internationally. These narratives, the cultural of production that surrounds technology standards, and the production of education technology culture are part of a global phenomenon that is facilitated by education technology stakeholders, ICTs, globalization, and broader development education efforts.

Examining ISTE as a case study and the NETS as a cultural object opens a small window to understanding more about how technology has come to play such a key role in the national and global education agenda. The NETS are cultural because of the high importance we attribute to them as a result of our social expectations of technology, standardization, and education. The NETS are a cultural object that we can "…talk, think about and imagine…. It is also cultural because it is associated with certain kinds of people…with certain places…because it has been given or acquired a social profile or identity…. These meanings, practices, images and identities allow us to place, to situate, to decipher and to study… as a cultural artifact" (Du Gay, 1997a, p. 5) the NETS.

By studying the NETS as part of our cultural and social practice, we can understand how shared meanings evolve and social practices become accepted; we can step back from the process to examine the NETS effects nationally and internationally and understand its benefits and challenges to the education community and beyond. By doing this, we can understand technology as a social phenomenon that resides within a subjective practice of those who orchestrate its place in society (Mackay, 1995). By understanding this process as subjective, we can gain more insight into the decision-making process that helps shape norms and expectations and, more importantly, understand how the end-users—in this case, the teachers and students—are involved in and affected by these decisions (Mody, 2000; Hudson, 2006; Warschauer, 2004; Main, 2001; Wilkins, 2000). Education systems are anchored in the nation to promote a shared cultural, social, historical, educational, and political value. However, education is now an international development project and an international collaborative process, facilitated by globalization, with a continual flow of projects, funding, and collaboration by decision-makers across nations. Gaining insight into ISTE's involvement in the globalization process and in promoting the integration of technology and technology standards in education helps us to see potential parallels between the development communication projects and the development of international standardization projects and other global education technology initiatives. Investigating parallels between development communication and digital-divide literature helps shed light onto the education development project, globalization, and the potential impact on the stakeholders that have the most to gain and lose when funding priorities and expectations are established and enforced.

ISTE: Producing Organizational Identity

To provide context for understanding how ISTE has contributed to the cultural development of the educational technology standards, we have to understand the cultural organizational framework and rationale within which these standards were developed. The organizational context for my research examines first, what I observed as ISTE's internal identity, second, ISTEs engagement with external stakeholders, and third, the rationale of addressing the digital divide that surfaced among both internal and external identities. Each of these organizational contexts contributed to the standards development process and the justifications for their development. Some aspects of internal and external identities that I observed are unique to ISTE, but many are core to the nonprofit identity in general. This is important because nonprofit organizations are often understated in their ability to influence social change. Nonprofits are actually situated in unique social, economic, and political positions that give them greater flexibility and, in general, more broad social acceptance and support. A nonprofit like ISTE, which contributes to the development of education technology culture, can therefore legitimately and deliberately engage a wide variety of like-minded stakeholders that cross the political, economic, and social sectors. ISTE and its stakeholders can then generate a common culture and expectation around education technology using the same language, conceptualization of need, and the production of a culture which self-perpetuates among these stakeholders. The internal and external identities that I observed, anchored through the lens of the digital divide, are what helped ISTE justify their engagement in the development of the NETS. These identities also helped contribute to the education technology culture by generating and recycling discourse and narratives that rationalize the need for education technology among the stakeholders. This production of education technology culture, perpetuated through the development of the NETS in the United States and internationally, is facilitated through ISTE's nonprofit status and associated internal and external identities.

Nonprofit Structure

Social change and globalization of technology, education, and business are not relegated to large corporations and governments, even though it seems that they wield the largest economic and political strength. Nonprofits also make strong contributions to civil society and the globalization process (Lewis, 2005; Frumkin, 2002). Nonprofit organizations come in many shapes and sizes. Some are run by volunteers or have one or two staff members, while others are multimillion-dollar operations with hundreds of staff. With a legally chartered tax-exempt nonprofit status, nonprofit organizations operate separate from the business and government sectors, filling social needs often ignored or neglected by formal private and public interests. Because the types, size, missions, and purposes of nonprofits vary so widely, they cannot be described as a single type of institution. Despite their nonprofit status, these organizations are often funded in a similar fashion and provide similar services which, as Frumkin (2002) notes, can overlap and compete with government and business. In fact, many nonprofit organizations are driven by profit and support activities and services guided by corporate and government influence directly and indirectly through federal, state, and local funding awarded through grants and special projects. Nonprofit organizations can also engage in political advocacy and product development and sales activity, which situate them in a unique place between the state and the market. Frumkin (2002) notes three features consistent across the nonprofit sector that distinguish nonprofits from business and government: "(1) they do not coerce participation; (2) they operate without distributing profits to stakeholders; and (3) they exist without simple and clear lines of ownership and accountability…these structural features give these entities a set of unique advantages that position them to perform important societal functions neither government nor the market is able to match" (p. 3).

These nonprofit characteristics, coupled with internal and external identities, and framed within the digital divide, helped ISTE anchor their efforts to justify the need for the NETS and their ability to facilitate their creation of them. Across historical and interview data, I observed ISTE's struggle to develop these identities and to frame the cultural narratives around education technology and the NETS. This identity struggle and perpetuation of education technology culture continues with the international expansion of education technology standards. The organizational mission and vision is the axis point from which nonprofit activity revolves.

Internal Identity: Organizational Mission

In nonprofit organizations, the organizational mission statement is often what board, leadership, and staff believes anchors everything that the organization does. The mission is how the organization solicits funding and measures its success in meeting the needs of the public. Iverson (2010) notes that evaluating the success of the organization in fulfilling its mission is difficult, "and effectiveness tends to be a social construction where mission is often defined based on outcomes that are more provable and tangible than from an altruistic stance" (p. 3). The mission is set to justify the existence and purpose of the nonprofit and to position it as a solution to a need in society. ISTE's mission is consistently referred to across interview data and historical archives as part of the justification for ISTE being the one responsible for creating a set of education technology standards from which to benchmark successful integration of technology to enhance teaching and learning. Being a professional nonprofit organization places organizations, like ISTE, in a unique position. Imagine if a corporation or government attempted to create a set of education technology standards. The likelihood for statewide or international adoption would be very slim. For ISTE, however, developing the NETS aligned well with their organizational mission. The ISTE mission has not changed significantly since the ISTE charter was developed:

> This international professional society is chartered to: (1) Promote and encourage the appropriate use of information technologies to improve the quality of education, (2) Support professionals using technology in education including teachers, information resource managers, educational technology specialists, researchers, curriculum coordinators, teacher educators, and others, (3) Cooperate with manufacturers, publishers, and other private sector organizations in identifying technological needs and in establishing appropriate standards for hardware, software, and other technology-based educational systems, products, and services, (4) Encourage research and evaluation relating to the effective use of technology in education and to promote the dissemination of such research to practitioners, and to (5) Promote the sharing of information and communication between professionals using information technologies in education from the local to the international level.[9]

The current mission and vision statements, along with the organizational values, reside on the governance section of the ISTE website[10]. The mission statement is more succinct than the original charter, but conveys a similar message:

> **Mission:** ISTE advances excellence in learning and teaching through innovative and effective uses of technology.

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[9] International Society for Technology in Education Charter, signed by various members, 1989.
[10] ISTE website accessed 2/1/12, http://www.iste.org/about-iste/governance/strategic-plan.aspx.

Vision: ISTE is globally recognized as the premier partner in advancing educational excellence through innovative learning, teaching, and leadership. We are a diverse worldwide community of educational leaders actively creating a world in which all learners can achieve their creative and intellectual potential.

Values:

I. ISTE believes that effective advocacy is critical in advancing the field and achieving the mission and vision of the organization.
II. ISTE believes that strategic partnerships and collaboration are essential to realizing a shared vision.
III. ISTE believes in organizational excellence, with a focus on innovation, transparency, and fiscal responsibility.
IV. ISTE believes in the power of a diverse and inclusive global community of members who learn, teach, and lead to advance the field.
V. ISTE believes global connections and partnerships advance educational excellence, teaching, and leadership for all stakeholders.

The mission is reflected or related to everything the organization does, from the board providing guidance to the organizational leadership down to departmental and staff engagement. It is important for ISTE to situate itself as a partner and convener of stakeholders internationally because the fostering consensus and unity in vision is what allows the organization to leverage their nonprofit status and mission focus. The mission is broad enough that it can encompass a wide variety of interpretations in terms of what is considered excellent, innovative, and effective integration of technology use in education. The vision allows organization leadership and staff to imagine what is possible for the organization; it was under this vision that ISTE established itself as the leader in global partnerships that advance education through the means of technology. The establishment of the organization’s mission statement is often the responsibility of the board members who vet it through organizational leadership and sometimes staff or members.

The main link that can be found connecting the mission of ISTE and development of the current standards is the concept of the "effective" use of technology for teaching and learning. Justification for funding requests, development, and dissemination of the NETS centers on creating specific benchmarks for assessing whether students, teachers, and administrators are using technology effectively to advance education. For example, in the 2011 Board of Directors minutes, it was reported that ISTE was to deliver a three-part course to support the NETS, called the NETS Leadership Academy. This academy is linked in the minutes to the mission of ISTE and its goal to "advance the field of education by enhancing the knowledge, skills, and abilities of teacher candidates, educators, and education leaders to teach, to learn, and to lead digital-age education effectively."[11]

For ISTE, the process of producing an organizational identity around mission has been a continual discussion among staff and board members that began in the early formation of the organization. ISTE's organizational identity of being a small, grassroots, membership-based organization is grounded in its early formation which began with a handful of committed technology enthusiasts, led by a university math professor at the University of Oregon. The organization initially had a small office in, and was meagerly funded by, the University of Oregon at a time when most of the focus of using technology in education was targeted on institutions of higher education. Researchers at the time were interested in the growing field of computer science and in exploring the application of technology in the fields of math and science. It was through initial National

[11] ISTE Board of Director Minutes, 2011.

Science Foundation funding that ISTE, then called the Oregon Council for Computers in Education (OCCE), began offering professional development training in the summers to high school teachers, instructing them on how to use calculators in their classrooms, for example.[12] Handwritten notes from early staff meetings highlight initial efforts of the small staff to negotiate the purpose for their organization and to set a course for the OCCE. The organization was operated on a largely volunteer basis from 1974 to 1981, when it gained nonprofit status. In an interview,[13] the founder recalled that, in the early days of the organization, his children would help him place labels and stamps to deliver the first publication he edited and distributed "semi-periodically," called the *Oregon Computing Teacher*, first published in 1974. Several conversations, found in staff meetings[14], demonstrate staff struggling to determine the identity, mission, vision, and purpose of the organization. One noted, for example, "I spend too much time digging and digging for scraps of paper…how funky-home-grown, and well-intentioned can we be?" Another documented conversation focused on whether or not the OCCE should "hard sell" their journal through direct mail with consensus among staff being that the journal is "…a professional journal, not a business and money-making venture. THERE IS A DIFFERENCE" [capitalization handwritten in notes]. In another instance, a staff conversation was documented, trying to justify their efforts and help create a mission and goal for the organization:

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[12] Interview with past ISTE executive, October 14, 2011.
[13] Interview with past ISTE executive, October 14, 2011.
[14] All these quotes were taken from a small booklet of handwritten notes, written by the organization director between 1981 and 1983, and found in the ISTE archives.

- Our reason: to make a better world through education, CIS and Ed
- …to be THE national umbrella organization: we need to learn how faster
- The business side exists to support the professional side
- …[the] goal is to support teachers who are trying to use computers in education

In the early days of these "home-grown" staff meetings at the University and then in the small home office that the OCCE staff rented, the organization became more formalized and changed names from the Oregon Council for Computers in Education to the International Council for Computers in Education (ICCE). At the time of this initial name change, board minutes from 1981 to 1985 reflect that ICCE had many members from Australia and Canada. During this time, ICCE created organizational memberships in addition to individual memberships and began printing and distributing the member journal to more teachers across the United States, Canada, and Australia. In 1989, the ICCE merged with another similar nonprofit education technology organization, the International Association for Computing in Education (IACE) and formed the International Society for Technology in Education (ISTE). Since the merger and name changes, the organization has grown substantially in budget, staff size, office space, and the product development and professional services it offers to customers in the United States and internationally. Through a series of strategic and business planning sessions post-merger, the organization formalized its mission and vision statements and organizational and governance structure. Despite significant growth in all of these areas, the early internal identity of being a small, grassroots, membership organization dedicated to making the world a better place through education with technology is an identity that has remained and that has anchored ISTE's past and present activities and goals. In both archival data and interviews, the cultural internal identity of being a grassroots membership organization that involves diverse education stakeholder groups is central to ISTE's mission and vision. In two interviews with ISTE leadership, grassroots identity was mentioned in the context of the organizational membership. Framing its organizational mission by pointing to grassroots teacher involvement creates the need for, and solutions to, educational problems. For example, in one of the early strategic planning working documents from May 1990, after ISTE had recently completed the merger, the board leadership was trying to establish a concrete mission and vision. The mission they were considering for public use was, *To improve education of all types, at all levels, and for all people throughout the world*. The mission was tied to two additional subcomponents:

1. To improve education that makes use of appropriate computer-related technology and education about appropriate use of computer-related technology
2. ISTE's greatest emphasis is on education in the US and Canada

The second mission they intended for internal use was noted as: *To build and increase ISTE's resources and ability to accomplish the public mission on a long term basis*. These aspects of the mission were summarized in an example they were working through in the documents: *To help educators and students to make appropriate use of computer-related technology to improve education*. In addition to exploring the mission and vision in this strategic planning document, it is noted alongside this discussion that the mission needs to be kept simple and powerful so that it can used effectively in publicity efforts, membership recruitment, and fund raising. Having an organization framed as being made for teachers by teachers, in a grassroots fashion, helped ISTE establish a sense of purpose and an anchor for advocacy and fundraising efforts. Organizational identity through mission and vision statements is reflected in data as equally important to ISTE's relationship and service to their members and stakeholder groups and also contributes to the organization's effectiveness in gaining support.

External Identity: Membership and Stakeholders

Membership Role

In my research, I observed that ISTE's cultural identity related to the external relationships with members and stakeholders has varied over time and continues to be debated by the board. Because nonprofits are often limited in staff and budget, the board and leadership has to make difficult decisions about how to allocate money and staff time to organizational activities and initiatives. For example, one such struggle relates to how ISTE should focus their current efforts: Should they build more robust member services or should they focus on expanding their organizational vision of growing their international business? Because ISTE is a nonprofit membership-based organization actively engaged in political advocacy that relies on its membership base, this question puts them in a difficult situation given their limited staff and funding. Even more, membership is core to ISTE's internal and external identity.

In early archives, membership is equated with a grassroots identity; the focus is on providing leadership and best practices to the ISTE educational technology-focused membership through teacher-oriented publications, and by and providing resources and services by way of an annual conference and professional development training. The board minutes throughout the 1980s and 1990s show concern about declining memberships; this decline was attributed to the types of publications ISTE was providing as a member benefit. For example:

> We are spending $24,000 more than we are taking in…our deficit is a matter of a decline in membership (-1500). Renewal rates are 75%. Canadian membership has stabilized; US membership shows across the board decline. Editorial staff is sensitive to the reader interest – [we need] more how-to and less theory. [15]

Responses to this type of concern were met with reflections on membership decline as being related to ISTE's lack of grassroots organizational identity. The consensus was that various tools could help ed-tech associations foster change; the first three tools were membership, curriculum standards, and having communities of advocates. Based on the board minutes, however, as the organization grew in terms of staff, membership, stakeholder involvement, and diverse activities, member focus and identity shifted from a grassroots orientation to one of customer identity. For example, in Board of Directors minutes from 2009, the focus was on membership related to facilitating growth and retention of members, to increase the corporate and affiliate membership, and to support membership with more resources that could be delivered online. When discussing the ISTE goal to achieve organizational excellence, this shift in membership focus related to ISTE developing a "capacity for business analysis," to "implementing measures of excellence in customer service and communications," and to

[15] Quote taken from ICCE Board of Directors Minutes, 1986.

"creat[ing] an organization-wide customer-service focus."[16] In interviews, all ISTE leadership informants referred to ISTE's mission as being central to everything they do. Two of them mentioned the grassroots nature of ISTE's membership, and one noted that "it is ISTE's grassroots membership that contributes to the life of ISTE."[17] In board minutes of recent years, the grassroots identity is mostly associated with advocacy efforts and membership; as noted in 2011, "[the] Web page to support local and grassroot advocacy efforts provides advocacy videos, recess schedules, links to key committees, [and] advocacy related resources."[18]

Members of the association are different from stakeholder groups. Members can be associated with stakeholder groups, and some stakeholder groups can be members, but the way ISTE focuses on, engages with, provides services to, and talks about each group is unique. For example, ISTE has 20,577 individual members internationally, but they also have 64 corporate members, 86 individual member countries, five affiliate regions worldwide (including Australia, Canada, India, the United Kingdom, and the United States), and 76 affiliate organizations across the United States, each with its own membership base. Different membership types and levels provide different access and pricing to various resources and services.[19] When ISTE discusses this membership base, it is in relation to resources and services they produce for members (which largely represent education technology specialists, campus or district technology coordinators,

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[16] Quote taken from ISTE Board of Director Minutes, 1990.
[17] Interview with ISTE executive leadership, 10/13/11.
[18] ISTE Board of Directors Minutes, 2011.
[19] Data taken from ISTE's 2010-2011 Annual Report, "Unlocking Potential."

librarians, administrators, professors, teachers, and curriculum specialists); members who serve as volunteers to support various activities sponsored by ISTE; and fundraising through membership dues or in advocacy efforts. Members do not provide direct input into organizational direction or activity, beyond having the privilege to vote for board leadership (which does provide leadership to the organization), nor do members participate in the development of the NETS beyond providing voluntary feedback to standards drafts. However, members are engaged directly in advocacy and networking in support of education technology. Individual members and organizational affiliate memberships have come to be very important to the advocacy work in which ISTE engages. ISTE uses this network of people across the United States to help influence national policies that support technology integration into schools and districts. ISTE policy staff work with stakeholders and special interest group members to identify key issues and to mobilize efforts that support federal and state funding for programs that ensure modern technology infrastructure, professional development for teachers, and technology prioritization. ISTE highlights the NETS as the unification across the country to support such efforts. In addition to advocacy work, members can participate in conferences, special interest groups, and volunteer work; publish information in member journals; and vote for board membership. Representation of membership through board elections has been very deliberate and has grown substantially as the organization has grown from its early days with a board of six members to its current board of 19 members. In 2011, the board engaged in conversations regarding the role of the board and how to increase the effectiveness of board decisions. A board summary analyzed the structure of the board as follows:

> …the prevailing sense of the work group is that ISTE's board is on the large size…. The work group achieved consensus towards looking at a smaller sized board…. With regards to representation – the work group has explored the concept of 'Competency vs. Constituency' boards. Competency-based boards ensure that governance is collectively composed of individuals who possess the necessary skills, competencies, and perspectives to effectively govern the organization. Constituency boards are based on representation of members or those served by the organization…. Member demographics suggest a possible gap in representation of school IT leaders on the board. Non-US members of the work group point out that the defined roles show a distinct US focus in their naming conventions and structure. The history of the board depicts a trend towards expanding to include more and more constituencies as the organization grew in size and influence.[20]

It is through this board structure that ISTE attempts to gain representation from its membership; it is the board that provides vision and leadership to the ISTE executive staff. This is in line with what Castor (2010) notes about nonprofit boards in general: Boards "…are crucial in providing governance and decision-making in nonprofit organizations. Boards are also a form of 'citizen participation' and as such, contribute to an evolving democratic process."

ISTE's internal identity linked to nonprofit status, organizational mission and grassroots, along with its external identity linked to member and stakeholder relationships, helps anchor ISTE's legitimacy as a contributor to the education technology culture, as an active participant in policy advocacy, and as the creator of the NETS and international standards development. In an interview with an ISTE staff

[20] ISTE Board of Directors: Board Composition Work Group Preliminary Report, September 8, 2011.

member, the value of membership to ISTE was emphasized with relation to the organizational members:

> [Organizational member] affiliates allow ISTE to have that reach into the district, school, and classroom that they couldn't have any other way being a national organization. We cannot lose the 80-plus affiliate membership; it's the most important with 20,000 individual members and 150,000 additional people through affiliates.[21]

It was explained during this same interview that the benefits organizational membership receive from ISTE (and that ISTE in turns benefits from) are many. These benefits include republishing ISTE articles in affiliate journals, discounted webinar sessions, networking events, cheaper access to ISTE conferences, and space at the ISTE conference to meet with regional membership. Additionally, corporate memberships were noted as critical to ISTE current operations, which have full membership benefits. For these members, regardless of the funding they may provide, they can be part of and to contribute to the organization. As such, ISTE allows corporate membership access to focus groups, facilitates meetings with executive leadership, and provides access to the membership to conduct market analysis and participate in special interest group sessions.

To grow the international organizational membership base, it was communicated that ISTE had to make major adjustments to the concept of what organizational membership requires. Institutional membership, being just two years old, was an exception made to the traditional rules of organizational membership. As ISTE has attempted to develop its international membership and reach, they have found that many countries outside of Canada and United States, especially in Latin America, do not

[21] Interview with ISTE executive leadership, October 30, 2011.

recognize individual memberships to organizations. The model is not familiar or desired. As such, the institutional membership level allows institutions to be flexible in their organizational structure so that they can participate in ISTE as members.[22] This notion of what constitutes a member and what has traditionally been considered a grassroots membership base has evolved as the organization as grown and become international in its scope. What began as a small group of like-minded computer-using educators has evolved to include a strong base of organizational affiliate members with their own memberships, corporate members, and now international institutional member organizations. A newly elected board president noted in the 2009 Board Minutes that, "…while the things we do will always be mission-focused, we will continue looking to the future and engaging our members. ISTE's message to teachers needs to be that ISTE is their organization."[23] To further establish greater legitimacy and broader reach through a diffusion type model, ISTE has made a concerted effort to engage stakeholders from a variety of sectors that have interest in seeing education technology integrated into schools.

Stakeholder Role

ISTE executive leadership and staff recognize that nonprofit professional educational associations, because of their mission and nonprofit status, play a key role in fostering partnerships with diverse stakeholder groups that have a common educational agenda. The federal government supported the standards-development effort with direct

[22] Interview with ISTE executive leadership, October 30, 2011
[23] ISTE Board of Directors Minutes, 2009.

funding and staff from the Department of Education Technology, who participated by giving feedback on NETS development. Corporate partners are also engaged in ISTE activities both as funding sources—including supporting the NETS—and also as member participants. One informant noted that

> ISTE believes strongly that we want to have a good relationship with corporations and companies selling to the education technology market because they are part of the solution. So, that public-private partnership is really important, and ISTE wants to be seen as a leader in that regard in fostering those relationships without endorsing products. Fostering these relationships and bringing these companies in front of our members is part of our mission.[24]

ISTE's nonprofit status and broad mission has allowed it to garner financial, political, and membership support from a variety of sources: the federal government, international NGOs, those who work in education, and corporate, private, and public interests. In addition, ISTE stays engaged with key issues across these sectors and serves as a facilitator and convener of partners to dialogue, collaborate, and advocate for the interests of ISTE and their partners. Archival documents, interviews, and the ISTE website continually note the importance of involving individuals who cross all sectors and the need to form partnerships and coalitions to reach common goals in integrating technology in education. ISTE's nonprofit status, mission, vision, and board structure is what has helped ISTE legitimize and actually facilitate the development of the NETS.

[24] Telephone interview with ISTE corporate relations leadership, November 2, 2011.

Like other professional education associations, two informants noted[25] that ISTE—as a nonprofit, professional, membership organization—was well-suited to develop education technology standards. It is a commonly accepted practice for professional membership organizations, like ISTE, in the position of leadership and advocacy in the education technology field, to engage in such efforts. ISTE's identity and past experience in creating education technology standards for teacher certification enabled ISTE to sign on representation from every major professional education association, the U.S. Department of Education, private businesses, education technology specialists, professors, teachers, and parents. These individuals were engaged in an intense, complex, and highly structured process to ensure that all stakeholders had a direct role in the development and vetting of the NETS.

In interviews with executive and senior leaders, the "ISTE mission" was referenced in a variety of ways, including being a requirement and criteria for organizational affiliate membership, as a motivator for getting grassroots involvement and contribution to organizational activities, as a justification for board investment of funds to support various projects, as the impetus for bringing together allies to advocate for federal support, and for fostering relationships with corporations and connecting them to individual members. To judge organizational success in reaching the mission and vision of the organization, the NETS project and subsequent sales derivatives provide a concrete product and value for the individual, organizational, and corporate membership

[25] Interview with current executive leader, October 13, 2011, and interview with past executive leader, October 14, 2011.

base. Part of the way ISTE can evaluate its success in fulfilling its mission is in the quantity of materials developed around the NETS and the reach and distribution of the NETS to education stakeholders. Several large sections of a grant final report[26] are dedicated to examining how to quantify this success, including collaboration efforts across a variety of stakeholder institutions, the number of faculty and pre-service teachers reached through dissemination efforts, and the number of institutions that have adopted, adapted, or used the NETS in some way.

In summary, the combination of ISTE's identity with its nonprofit mission and vision and the grassroots participation of ISTE's membership and stakeholder groups helped generate the justification for the need for the NETS and legitimized ISTE's role in facilitating the creation of the NETS. Both the internal and external identities, linked to the education technology culture, were further justified by acknowledging that both the organization and the development of the NETS were dedicated to addressing the digital divide.

The Digital Divide: Anchoring Identity and Perpetuating Education Technology Culture

Despite the seemingly ubiquitous presence of technology in the United States and internationally, we continue to face issues related to the digital divide across many social sectors, not the least of which is education. Through federal, state, and local policy and funding efforts, the majority of schools are now networked, although not all are

[26] U.S. Department of Education PT3 Grant Final Report, 2003, National Educational Technology Standards for Teachers: Establishing Performance-based Standards and Assessments for Improving Technology Competence in Pre-service Education, International Society for Technology in Education (ISTE), PR/Award No. P342A-990498

connected to high-speed broadband. Most schools now have computer labs, and at least one computer is accessible in each classroom (at a minimum, there are roving laptop stations that are shared among teachers). Students, today often referred to as *digital natives*, are now familiar with computers as well as the myriad other technologies they interface with daily, most typically in social networking. Although these changes can be seen as major improvements since the early series of *Falling through the Net: Defining the Digital Divide* reports were produced by the National Telecommunications and Information Administration (NTIA) in the U.S. Department of Commerce, our schools continue to face challenges when it comes to creating and maintaining a strong infrastructure to support technology use for teaching and learning. Saying that the digital divide is a gap between individuals who have access to Information Communication Technologies (ICTs) and those who do not oversimplifies the complications that contribute to this social, cultural, and economic challenge. Factors that contribute to variability of ICT access and use across society relate to the inter-related differences and/or complications of income, language, literacy level, social and cultural capital, race, and gender.

So, where do education technology standards and ISTE fit into this discussion about the digital divide? There are several key ways the digital divide surfaced in my research. The first is in how I see ISTE leadership associating with the digital divide—as justification for its work. The second is how the digital divide is linked to development of the education technology standards.

The digital divide and issues related to the digital divide surfaced in archival materials. In the majority of cases, the digital divide was related to grant applications to develop the NETS and derivative materials and served as a justification for why developing the NETS was critical to help foster equity in schools. Likewise, in interviews conducted with ISTE leadership, when I asked about the most important role that technology plays in education, I received the following responses:

- …to engage learners, to put kids on an equal playing field so that disadvantaged kids have access to technology at school, and to ensure that students have the experiences at school and learning experiences at school that are going to help them in careers or college.[27]

- What we are doing is really important. When you provide quality engaging education, you give kids a reason to hope that they can better their situation in life, that they can invest in themselves and get payback from it. Once a young learner loses that, it's not like they can get it back. We need to extend that envelope of hope for those kids as long as we can so that they believe that somebody is interested in them…investing in themselves is worth doing and giving teachers the tools and abilities to contribute to that in a meaningful way. That is what we do. Best practices, relevant learning, and skills development—all of this is important, and technology is our favorite tool or toy to accomplish that.[28]

- …it's making education relevant to the times we live in. We are surrounded by technology in our daily lives. It's so ubiquitous that you don't even realize it…technology is all around us and the schools haven't kept up with that. That is our whole point of being…. We are in a tough time now that there are so many new things coming out, because things are changing so fast. I'm sure there is money being wasted because school systems are sometimes making purchases, maybe not the wisest purchases, in terms of technology. I think

[27] Telephone interview with policy leadership at ISTE, November 2, 2011.
[28] Interview with ISTE executive leadership, October 30, 2011.

> because things change so rapidly. I've heard superintendents say that choosing what to buy and use is a real challenge. The standards provide one-on-one help in guiding how we use technology in the classroom. That is where some of the challenges are similar everywhere. It comes down to money to buy the technology, money to pay for professional development, all of those things it takes to get technology in the classroom in the first place and how to get it effectively used.[29]

In addition, in two separate interviews, policy development and advocacy efforts related to the digital divide surfaced. In one case, it was noted that the advocacy work that ISTE engages in is related to issues that are largely driven by directions or initiatives supported by various government administrations. ISTE policy staff focuses on finding and presenting ways that it can develop proposals to fit within legislation and to justify funding and support for ed-tech related projects. Examples include programs such as the E-Rate program, the Elementary and Secondary Education reauthorization, jobs-related acts (which have components that effect education with regards to salaries for educators or for school modernization), and those that relate to broadband infrastructure or the digital divide. "Digital divide issues are very often incorporated in federal programs which are geared toward low-income kids, and we can work to weave technology into these programs."[30]

ISTE collaborates with other ed-tech groups and ISTE's corporate community to advocate for these education technology initiatives.[31] Although interview data reflect this

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[29] Telephone interview with ISTE corporate relations leadership, November 2, 2011.
[30] Telephone interview with policy leadership at ISTE, November 2, 2011.
[31] Telephone interview with policy leadership at ISTE, November 2, 2011.

connection between advocacy and the digital divide, it also reflects a frustration with the current Obama administration for not taking these issues seriously.

- This administration is frustrating because they have rhetoric around ed-tech but funding is devastating—they haven't been good at dedicating funding for ed-tech or ed-tech within new ESEA…. They talk about infusion of technology but they don't follow up with money or direction.[32]

- …it makes a difference with every administration. The Bush administration was really dedicated to finding the most needy schools and supporting them and we could support that to a point, but that isn't where your best innovation comes from. On the other hand, the Obama administration wants to see us out-innovate and out-build tools and even create an export industry out of education technology, but they won't even support teachers learning to use the stuff we have now.... They've basically eliminated dedicated funding for classroom technologies and for teacher training and the use of technology, and they've gone to funding innovation, which we need, we need R&D, it's important, but it's not the only thing.[33]

Creating a level playing field and providing high-quality education opportunities for all kids through effective use of technology in education is a common theme identified not only in interviews but also in archival data. In a document geared towards providing curriculum guidelines for accrediting education technology programs, ISTE noted

> The challenge facing not only American schools but schools all over the world is the empowerment of our children to function effectively in their future. This future is marked increasingly by change, the growing importance of information and information access, and evolving technologies. It is also marked by an increasing disparity between those who have the information technology skills to cope in a modern society

[32] Telephone interview with policy leadership at ISTE, November 2, 2011.
[33] Interview with ISTE executive leadership, October 30, 2011.

> and those who are deprived of the opportunities to acquire those skills. To avoid even greater inequities in this information age, schools must equip students to become effective in solving problems and accessing and managing information of relevance to themselves and to society.[34]

In applying for federal funding to support the creation, publication, and dissemination of the initial standards, the ISTE proposal to the U.S. Department of Education highlights how development of the NETS project aligns with and supports the overall national goals for legislation to improve education through systemic educational reform for integrating education technology, to collaborate with other key agencies to achieve national education goals, and to "raise standards and expectations for academic achievement among all students, especially disadvantaged students traditionally underserved in schools."[35] The rationale for education technology standards addressing issues of equity was that standardization establishes a common expectation of what all teachers and students should have access to; with this expectation, schools and districts can leverage funds and community support to acquire technology tools and training. The proposal goes on to recognize that the U.S. Department of Education and state governments are focusing on developing higher standards for benchmarking student performance in schools, noting that standards were also being developed for math and the other curriculum. Because technology expectations were also included as part of the Goals 2000 improvement plan, ISTE makes the appeal that technology standards should also be developed. In the proposal it is noted that

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[34] *Curriculum Guidelines for Accreditation of Educational Computing and Technology Programs: A Folio Preparation Manual*, Developed by International Society for Technology in Education Accreditation and Standards Committee, Third Edition, 1998, p. 1.

[35] A Proposal for the National Educational Technology Standards (NETS) Project, Introduction.

> [l]earning technology includes the mastery of text, graphics, video, and data to enable the student to learn interdisciplinary content in the pursuit of solving problems. Learning technology in its best sense cuts across all content areas and enables the student to learn better and the teacher to be more productive. Learning technology is as important as the printing press was in the 17th century when it enabled learning to be transferred to an invention called schools…. A clear conception and an establishment of Learning Standards will do much to change the very concept of learning and teaching. It will be the dominant change agent if school reform is to be successful. Therefore, Learning Technology Standards are the most critical elements of the educational reform movement. Correctly applied, they will provide management and assessment of individual student's growth and development and give students the tools needed for work in the 21st century.[36]

In this proposal for federal funding, the digital divide is linked to preparing students for jobs in the twenty-first century; both are used to justify the need for and development of the NETS. Developing national standards for education technology is one of the ways that ISTE describes how it can effectively address the digital divide by creating a set of common expectations across the United States with similar efforts achieved internationally. As one ISTE executive leader pointed out, if national governments were to adopt education technology standards, they would be responsible for funding and supporting them, so they don't do that. States adopt the standards as guidelines that serve as a way to benchmark "what students need to know and do, and to evaluate how technology can help facilitate what kids know and do, to assess what teachers need to do to enable kids to be successful, and to assess what administrators need to do to make teachers successful."[37] In *Teaching with Poverty in Mind: What Being*

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[36] A Proposal for the National Educational Technology Standards (NETS) Project, Potential Contribution of the Project, p. 3.
[37] Interview with ISTE executive leadership, October 30, 2011.

Poor Does to Kid's Brains and What Schools Can Do about It, Eric Jensen (2009) notes some of the benefits standards-based reform have provided and how this reform has impacted the achievement for students living in poverty. Jensen notes that standards do the following:

- Expose social inequities in school performance–schools must report test results separately for students in different demographic subgroups.
- Obtain better opportunities for disadvantaged students–schools not achieving adequate yearly progress receive transfers and supplemental services.
- Improve opportunities for disadvantaged students–No Child Left Behind requires districts to place a "highly qualified teacher" in every classroom.
- Promote curricula and teaching methods for which there is scientific evidence of success.
- Put everyone on the same page at each grade level, no matter what school you attend.

Because standards are linked to high-stakes evaluations and funding, Jensen argues that they can help turn around low-performing schools. The high-profile nature of school success ideally forces teachers, administrators, and parents to work together to align curriculum to standards. The link between education technology standards development and the digital divide is similar to this argument: If we have a common set of expectations for how technology can be used for teaching and learning, we should ideally see our schools realize their technological potential. Obviously, it takes more than just developing the standards themselves; many aspects concerning technology integration success—aspects that ISTE calls "essential conditions"—must be considered. These conditions range from having shared vision and empowered leadership to ongoing professional learning and technical support. Many of the conditions are identified for supporting the NETS for students, teachers, and administrators. Together, the development of the NETS, the recognition of the essential conditions necessary to ensure their successful integration, and ISTE's advocacy efforts are the methods ISTE has used to address the digital divide in schools and are also the justifications and rationale ISTE has used to support its overall organizational efforts.

SECTION II: ISTE: PRODUCING NATIONAL EDUCATION TECHNOLOGY STANDARDS (NETS)

Historical Development of the NETS

ISTE's initial consideration for developing education technology standards began in 1985 when the organization's board approved the development of an accreditation committee, as noted in the board minutes.[38] Development of the standards is not mentioned again in the board minutes until 1989, when the board approved ISTE joining The National Council for Accreditation of Teacher Education (NCATE) for $6,000. It was noted in the minutes that the purpose for joining this group would be that ISTE could help create standards for teacher accreditation programs approved through NCATE and that "the committee [could] continue its work in establishing guidelines for computer education."[39] By 1990, the board minutes reflect that ISTE had gained representation on the NCATE board and established a staff liaison to NCATE. It was not until 1991, in the Executive Committee Notes, that discussion about the purpose or meaning of standards development by ISTE is documented:

> One executive board member wanted to know "what would be involved for ISTE to establish a set of standards similar in scope to those that had

[38] ICCE Board of Directors Meeting Minutes (1985).
[39] ISTE Board of Directors Meeting Minutes (1989).

> been established by the NCTM [National Council of Teacher of Mathematics]. Would it be possible to have the basic standards outline ready for NECC 91?" Another executive board member replied "that it was a possibility. The standards being for teacher preparation…the Foundations being proposed would be more for the K-12 classroom teacher – What you need to know about computers to use them effectively when teaching in schools." She was responded to by the previous member that, "Explained to the Executive Committee that the NCTM has two sets of standards. Teacher Standards and Curriculum Standards." A third executive board member then noted that he "Felt that the Accreditation Committee members should try and get on the Chief State School Officers Council."[40]

As a result of joining the NCATE, ISTE was able to develop a set of performance-based guidelines, approved by NCATE, called the Technology Leader, Technology Facilitator, and Secondary Computer Science Educator standards. These standards were established as benchmarks used for evaluating U.S. university education computing and technology programs for teachers. ISTE's rationale for developing these standards for teacher endorsement in educational computing and technology literacy was that "[i]f technology is to become an integral component of the educational process of our schools, it must first become an essential part of America's teacher preparation programs."[41] To develop these initial standards, which have evolved into the current NETS for teachers, historical accreditation documentation shows that ISTE conducted a literature review of technology competencies from professional literature, and from these created a survey that was presented to attendees of their annual education technology convention and submitted to members through an early member publication called *The Update*. Between 1990 and 1996, ISTE conducted surveys through their Organizational

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40 Executive Committee Meeting Notes (1991).

41 Curriculum Guidelines for Accreditation of Educational Computing and Technology Programs: A Folio Preparation Manual, Developed by International Society for Technology in Education Accreditation and Standards Committee, Third Edition, 1998, p. 1.

Affiliate members, their individual members, and attendees at their annual education technology convention. Over this time, they drafted and received input from Special Interest Group members; NCATE members including university deans, executive officers, and liaisons of NCATE member organizations; and the Chief State School Officers. Final drafts of the guidelines were completed in 1996 and were called Educational Computing and Technology Literacy guidelines and the Education Technology Leadership programs that were adopted by NCATE.

Additional secondary endorsement guidelines then followed and were adopted by NCATE in 1997 after further input from “the education community.” The document notes that “[t]hrough input from hundreds of educators, the guidelines were developed and refined. These guidelines have been considered and adopted by ISTE and NCATE.”[42] Discussion of standards development in board minutes also reflect the need for grassroots involvement in standards development, with one member recommending that ISTE apply for National Science Foundation (NSF) funding to support a National Education Technology Summit where the conceptualizations of standards could be discussed among attendees. Another board member took “exception to a rushed decision without grassroots support. It looks like a top-down decision.”[43]

It is important for some nonprofit organizations, like ISTE, to gain or promote the legitimacy of their efforts by involving key stakeholders—in this case, the “education grassroots community,” as a representation of civil society (Lewis, 2005). As previously

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[42] *Curriculum Guidelines for Accreditation of Educational Computing and Technology Programs: A Folio Preparation Manual*, Developed by International Society for Technology in Education Accreditation and Standards Committee, Third Edition, 1998, p4.
[43] ISTE Board of Directors Meeting (1991).

discussed, the “grassroots organization” is noted in interviews and board documentation as being part of ISTE’s culture and rationale for how it does business. This is evident in the advocacy-related work that ISTE promotes on their website and at conferences, as well as in how they discuss and organize the development of their standards development work.

In 1994, ISTE submitted a standards development planning proposal to the National Science Foundation; board minutes noted that ISTE was seeking government funding as well. One board member noted that the NSF reviewers provided feedback to the ISTE proposal advising ISTE that it needed to assemble an alliance of partners for the project.[44] ISTE was able to secure funds from a proposal submitted to the National Aeronautics and Space Administration (NASA) with the intent of assembling project partners to create a plan for initiating a standards development plan and to begin gathering data and writing the initial standards. The official NASA document noted the grant as a research award titled, “Using Standards Development in Applying Technology in Appropriate Ways in Learning and Testing Process.” ISTE documentation on this initial NETS project summarizes the project’s goal as to “…improve education through the effective use of technology. This will be achieved by the development and dissemination of standards for educational technology.” They note that these goals will be attained

> …through coordination and technical expertise, major stakeholders in K-12 education to develop national standards for the educational uses of technology that will facilitate school improvement in America. In an era

[44] ISTE Executive Board Minutes, 1994.

> when our schools are called upon to improve student achievement, it is increasingly important to take advantage of technology's ability to enhance teaching and learning. The standards prepared by ISTE for preservice teacher education provide the groundwork for technologically skilled new teachers. The next step in this standards development effort is to provide guidance to schools by addressing technology competency standards for students and establishing specific applications of technology throughout the curriculum.[45]

In addition to assembling stakeholders to address school improvement in America with technology, the summary goes on to note how standards are linked to improving school funding, increasing teacher efficacy in using technology, and implementing universal access to technology.

> Technology should empower students for life-long learning and productivity, but this requires the development of a curriculum and supporting environment in which students and teachers can apply technology in appropriate ways in the learning and teaching process. There are many barriers that prevent schools from providing this empowerment. Some barriers, such as inadequate funding for K-12 schools, restrict students' access to the technology. Additional barriers result from failure to develop skills and expertise among educators that permit them to apply the technology effectively in educational settings. In various educational reform initiatives, technology plays a key role. The legislation for Goals 2000 sets as a national priority universal access to technology for teaching and learning. There is a need to go beyond this legislation and develop specific standards for technology-rich curriculum in PreK-12 education and in preservice and inservice teacher education, for support of learning, and for teaching practices. Standards, which are statements of values, are necessary for the following reasons: they ensure quality, they document and communicate common goals, and they promote change toward these goals.[46]

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[45] Brief Summary of NASA Planning Grant for NETS Project Introduction.

[46] Brief Summary of NASA Planning Grant for NETS Project, Need for Technology Standards.

The NETS Development Process

The standards development process was set up to be completed over a series of phases: from initial planning, to development of the standards, to dissemination of the standards, and finally to development and dissemination of curriculum support materials and assessment and evaluation measures. The initial project partners involved in the NASA-funded planning project included seven partner organizations and six curriculum organization representatives.[47] These curriculum liaisons were responsible for actively participating in the development of the standards and creating applications of technology to their specific curriculum areas. The actual development structure was an elaborate effort based on standards developed by the NCTM. The process structure was established to accommodate a continual flow of research, review, development, and revisions to incorporate changes in technology and in pedagogical research. Proposal documents show that the first phase involved garnering expert opinion through research and literature review. Information gathered in Phase I went into developing working drafts from which stakeholders could provide insight and opinions on what should or should not be included. These results were reviewed by what ISTE called “distinguished reviewers,” refined, and then distributed for public comment. This information was then sent out to writing teams that drafted the standards in work sessions. The writing teams were

[47] The Association for Supervision and Curriculum Development (ASCD), The Council of Chief State School Officers (CCSSO), The International Society for Technology in Education (ISTE), The National Association for Secondary School Principals (NASSP), The National Education Association/The American Federation of Teachers (NEA/NFT), The National School Board Association (NSBA), The Software Publishers’ Association (SPA), Representation from The National Council of Teachers of English (NCTE), Representation from the National Council of Geography Education (NCGE), Representation from the National Council of Social Studies (NCSS) and, Representation from the International Reading Association (IRA)

composed of teachers and stakeholders representing higher education; grade-level specialists; curriculum specialists; business, administration, and technology specialists; library specialists; special needs specialists; and parents. After many internal and stakeholder reviews and multiple work sessions, the final standards draft was distributed for external review by "…the Standards Review Council, the educational community and general public through a variety of means…structured evaluation sessions at professional gatherings and print surveys through webpages, mail, and fax."[48]

Using additional funding through grants from NASA in consultation with the U.S. Department of Education, the Santa Monica-based Milken Exchange on Education Technology, and Apple Computer, Inc., ISTE was able to complete the planning phase of the project and then submit additional proposals to the U.S. Department of Education to fund the development of the standards. Through additional federal funds, another product was developed and disseminated—a book titled *NETS for Students: Connecting Curriculum and Technology.* This book helped provide hands-on classroom activities for teachers to understand how to directly apply the standards to their instruction. The federal government helped print and distribute 20,000 free copies while ISTE distributed 25,000 free copies. The process that was implemented for developing the standards evolved out of the process used to develop the national math standards and the planning grant process that ISTE implemented initially. The focus of the process was "an iterative, collaborative process governed by key constituency representatives and others responsible for funding

[48] A Proposal for the National Educational Technology Standards (NETS) Project, Quality of Procedures and Documentation of Activities and Results, p. 15.

and implementing the resulting standards. This process provides a hearing to all concerned parties and includes consensus-building activities…innovation in the project comes in the form of both the process and product."[49]

The emphasis on the quality of the standards is determined in the proposals by the collaborative effort and input of the partners who participated in the development process. The process began with research that ISTE had conducted before receiving the federal funding, through the Teachers, Technology, and Children On-line Standards (TTACOS) Project. ISTE gathered opinions of teachers who were proponents of using technology in their classrooms, through statewide networks in Texas and Florida, "regarding what students in each grade level should know about technology and be able to do with technology. They also submitted their favorite activity in which technology is used to support instruction."[50] This input was shared in sessions at the Texas and Florida state conferences to get feedback from attendees. From this baseline information, ISTE established the initial framework for the educational technology skills and knowledge that students and teachers should have, grouped into five domains: Basic Operation and Concepts; Social, Ethical, and Human Issues; Productivity Tools; Technology-Based Communications; and Research, Problem-Solving, and Decision-Making. Three sets of standards evolved out of this process, including the NETS for Students, which laid out the expectations for what students should know and be able to do with technology at grades 2, 5, 8, and 12.

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[49] A Proposal for the National Educational Technology Standards (NETS) Project, Development or Demonstration of Innovative Strategies that Build Upon Existing Strategies, p. 6.
[50] A Proposal for the National Educational Technology Standards (NETS) Project, Capacity for Addressing Need, p.17.

The NETS for Students standards were followed by the development of Connecting Curriculum and Technology, which documented sample lesson plans and strategies that teachers can use to apply technology across the curriculum; the NETS for Teachers standards, which provide performance indicators for teachers' use of technology in instruction, assessment, professional productivity, and practice, outlining what teachers should know and be able to do with technology to improve student learning and their own productivity; and the teacher educator guidelines, NETS for Teachers: Preparing Teachers to Use Technology. Through funding and collaboration from the Milken Family Foundation, ISTE convened a Professional Development Standards Leadership Task Force comprised of K-12 stakeholders, teachers, and staff development specialists, each of whom ISTE considered to have a national reputation. This task force was charged with framing and drafting the NETS for Teachers, which was reviewed by a variety of education stakeholder groups.

For broad audience input, ISTE documented solicitation of feedback through a variety of means and prioritized a top-down approach, noting that "participation and support from the top level is key to the promotion and sustained use of the standards. The next focus will be school districts, particularly their technology and staff development units. Teachers' and administrators' organizations will be a third focus. Parents, business, and industry, and the general public are also important stakeholders in K-12 education and will form the fourth focus."[51] Reaching national consensus among educators for the

[51] A Proposal for the National Educational Technology Standards (NETS) Project, Innovative Methods for Addressing Purposes, p. 17.

development of the NETS for students and teachers is a common narrative woven into proposals and final reports to granting agencies as is the fact that ISTE has had sustained involvement in creating education technology standards since the late 1980s. This combination of experience and consensus helps lend legitimacy to the need for standards, the process for developing them, and the resultant adoption of the standards across the United States and internationally.

In the final report to the U.S. Department of Education, it is noted that

> Applications for Writing Teams were solicited online and at conferences. From approximately 250 applications 45 were selected…participants were selected based on their applications and on their job type…not only was consensus developed among the stakeholders towards the standards, but the process created a feeling of ownership of the standards and an up-front knowledge of the type of standards that would be released. Over 1,000 individuals provided input on all sets of standards. The process created a significant buy-in across the country for the standards. Throughout the process the drafts and opportunity for feedback was available on line…users could begin thinking about the standards, how they might alter their lessons, how they might get the resources they needed. It also gave corporate providers opportunities to plan for their products and their professional development resources. It gave administrators opportunities to think ahead on how they might manage their district or school resources to address some of the conditions that adoption of these standards would create.[52]

In the same report, it is noted that 48 of 50 states in the United States "have used one set or more of the NETS standards as the guiding technology standards for their state [which] represents extended use and influence on teaching and learning with technology in participating states. Many companies have aligned their standards with the NETS,

[52] U.S. Department of Education PT3 Grant Final Report, 2003, National Educational Technology Standards for Teachers: Establishing Performance-based Standards and Assessments for Improving Technology Competence in Pre-service Education, International Society for Technology in Education (ISTE), PR/Award No. P342A-990498

textbooks have been built around the NETS, and the NETS project documents and additional NETS spin-off books are used as texts in many colleges of education...In terms of professional development, several companies have had ISTE review their products for NETS alignment…. Teacher preparation institutions must now address in their conceptual framework, their 'commitment to technology.'"[53]

ISTE relied upon, and referenced Rogers' (1971, 1983) work on diffusion of innovations in their project report[54] as rationale for their project strategy in using a top-down network of leader partners and the grassroots network of its members to get out the word about the NETS. Research was conducted as part of a process to evaluate how well the collaborative/consensus-building process worked, who was involved, and so forth. As a result of the project, the quantitative research results show that close to 40,000 university faculty were reached, as were 120,000 pre-service teachers and 900 teacher education programs.

In the same report to the USDOE, there is a section that focuses on "lessons learned" in the NETS development process that impact successful NETS integration. "…[E]ssential conditions should guide the development of programs and collaborations among schools and teachers preparation programs to ensure that environments and support for integration of technology in the schools are addressed." These essential

[53] U.S. Department of Education PT3 Grant Final Report, 2003, p. 23. National Educational Technology Standards for Teachers: Establishing Performance-based Standards and Assessments for Improving Technology Competence in Pre-service Education, International Society for Technology in Education (ISTE), PR/Award No. P342A-990498

[54] U.S. Department of Education PT3 Grant Final Report, 2003, p. 23. National Educational Technology Standards for Teachers: Establishing Performance-based Standards and Assessments for Improving Technology Competence in Pre-service Education, International Society for Technology in Education (ISTE), PR/Award No. P342A-990498

elements include support from visionary leadership, high-speed infrastructure, student and teacher access to hardware and technical support, and teacher collaboration, demonstration of best practices, and professional development. These essential conditions for implementing the NETS provide a roadmap to administrators and teachers to help them recognize issues of the digital divide and acknowledge that successful integration and use of technology goes far beyond, but includes, having access to technology. In addition to addressing the digital divide through creation of the essential elements that accompany the NETS for students, teachers, and administrators, this same theme was present in helping to justify development of the standards in order to level the playing field and to create a common expectation across the education system to ensure that administrators could seek funding and support for integrating technology if technology standards were officially adopted by state governments.

The NETS Refresh: Revisions for the Digital Age

Since the initial development of the NCATE and the NETS for students (1998), teachers (2000), and administrators (2002), each set of standards has gone through different phases of the *Refresh* process, which began in 2006. The Refresh was essentially a revision of the initial set of NETS to address contemporary language and to infuse them with new ways of thinking about the role of technology and standards in education. In contrast to the initial standards, which were funded largely by federal and grant funds, the Refresh project was funded by corporate partners, such as Apple, Adobe, Intel, Atomic Learning, and Microsoft. The difference in funding sought for this effort was a result of a lack of government funds to support such an effort.[55] The narrative represented by the education technology culture is reflected in the NETS Refresh project as justifying the need to address the challenges of the digital age and to address broad school reform. This narrative, representing the need for education technology, changed from the initial NETS development, which communicated that education technology was a tool for learning. With the NETS Refresh project, the narrative shifted to align with the broader education technology culture that sees a broader use for education technology—not as just a tool, but as an application for learning, providing a new way to learn, and being a part of the learning process itself. The new education technology culture produces narratives around the fact that technology is ushering in a new age of learning and teaching, creating a collaborative learning process between teachers and students, and offering access to the education, jobs, and social networks required for success today.

To address these narratives and the new cultural perspective surrounding education technology, ISTE made adjustments to each of the sets of NETS. For students, the revisions focused on integrating more higher-order thinking skills and knowledge of what ISTE terms *digital citizenship* to help "students learn effectively for a lifetime and live productively in our emerging global society."[56] The emphasis on digital citizenship in this case refers to teaching students how to "understand human, cultural, and societal issues related to technology and [to] practice legal and ethical behavior" (Ribble, 2008). For teachers, the revision focuses on providing "a framework for educators to use as they

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[55] Interview with ISTE executive leadership, October 30, 2011.
[56] ISTE website, http://www.iste.org/standards/nets-for-students.aspx, 1/25/12.

transition schools from Industrial Age to Digital Age places of learning."[57] For administrators, the goal of the NETS Refresh was to emphasize the "hallmarks of the new school leader" and to provide a roadmap to school leaders to ensure visionary, successful integration of technologies into schools, and to "create and sustain a culture that supports digital-age learning...collaborating as co-learners with colleagues and students around the world." [58] Whereas rhetoric and justification for early development of the NETS focused more on issues of needing to build infrastructure and foundational skills of technology applications and bridging the digital divide, the NETS Refresh focus was broadened to emphasize the needs and challenges surfacing in the digital age–a global world of interconnected learners who must compete and collaborate in a world with different expectations for how students learn and how teachers teach. The language becomes less about teaching best practices and instead emphases a *flat classroom* with co-learning among teachers, students, and administrators who are all partnering for success.

Early board minutes identified that the initial NETS development would be expected to go through continual reviews and revisions based on the speed of change and improvements in technology. By 2006, the Standards and Accreditation Steering Committee, along with ISTE leadership and the board, felt that a refresh of the NETS was necessary; the trends in technology had evolved from a technical focus on learning how to use the technology to learning how to apply the technology in order to learn. Additionally, as noted in an ISTE-created Refresh training presentation template, ISTE

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[57] ISTE website, http://www.iste.org/standards/nets-for-teachers.aspx, 1/25/12.
[58] ISTE website, http://www.iste.org/standards/nets-for-administrators.aspx, 1/25/12.

felt that it “[n]eeded to update the language of the NETS to reflect the digital age. ISTE decided to refresh the standards because of rapid changes in technology, learning environments, and instruction.”[59] The development process for the Refresh differed in scope from the original plan because of funding restrictions; however, it was noted that many of the original writer contributors to the NETS project also contributed to the revisions. One interviewee noted that stakeholders contributed to the Refresh project by *crowd sourcing* over a period of three years, during which input was gathered at conference forums by asking broad and open questions such as “what should students be able to do with technology?”[60] Additional input was sought through the ISTE website and through the traditional ISTE-affiliate and membership network.

In board minutes surrounding the revision of the NETS as well as on the website and in funding proposals, ISTE used the rationale of broad stakeholder involvement to legitimize the Refresh process, just as it did for the initial NETS development. For example, the ISTE website notes, “ISTE relies on the wisdom from the field to update and revise the NETS. Since 2006, when we launched the NETS Refresh, thousands of educators weighed in on efforts to refresh the student, teacher, and administrators standards.”[61] Not only is the international contribution emphasized, the grassroots identity is integrated back into the rationale for the Refresh process. Revising and refreshing the standards is associated with the need to solicit “input from the field to get educators’ best thinking, to know that the standards reflect educator needs, and to build

[59] ISTE Refresh PowerPoint Presentation Template, "Refreshing the ISTE-NCATE Standards,” November 2010.
[60] Interview with ISTE executive leadership, October 30, 2011.
[61] ISTE website, http://www.iste.org/standards/nets-refresh-project.aspx, 1/25/12.

grassroots buy-in for the standards."[62] This combined rhetoric of addressing the needs of the digital age and involving broad grassroots participation legitimizes the production and re-production of the NETS. What differs widely in the Refresh rhetoric and process as reflected in interviews, the website, and in funding proposals, however, is the emphasis on the *global* aspect of the development process itself as well as in the solicitation of global participation in the NETS Refresh project.

The ISTE website highlights not only the international focus but emphasizes such terms as *digital world*, *global and digital society*, and *digital-age learning*, which now contribute to the value the NETS provide to education stakeholders.

> To address the rapid changes in technology, instruction, and learning environments, ISTE recently led a collaborative, international effort to refresh the NETS. Thousands of educators and education leaders participated in the project, resulting in the release of the refreshed standards beginning in 2007.
>
> NETS•S: The skills and knowledge students need to learn effectively and live productively in a digital world.
>
> NETS•T: The skills and knowledge educators need to change the way they teach, the way they work, and the way they learn in an increasingly connected global and digital society.
>
> NETS•A: The skills and knowledge school administrators and leaders need to lead and sustain a culture that supports digital-age learning, builds a vision for technology infusion, and transforms the instructional landscape.[63]

[62] ISTE Refresh PowerPoint Presentation Template, "Refreshing the ISTE-NCATE Standards", November 2010.

[63] ISTE website, http://www.iste.org/standards.aspx, 1/25/12.

When discussing the focus on international participation with ISTE executive staff, it was explained that, in 2007, ISTE was considering ways it could use the NETS as a foundation for starting conversations, but modify them internationally by collaborating with various countries to address their own priorities. During the Refresh process, ISTE put a lot of effort into soliciting international participation; as a result, professionals from 40 different countries contributed to the revisions. During the development process, ISTE intended to focus on global expectations, not just those of the United States, because the conditions for successful integration of technology in education are the same on a global scale. The focus on integrating education technology is now more on fostering the necessary conditions and less on building competencies; the focus is more about participating in a global collaborative process than about developing a set of standards for adoption only in the United States.[64] In a business plan developed in 1997, ISTE staff note that "ISTE is an excellent source of information and consulting on national standards or guidelines. ISTE is also interested in joining local and regional projects to develop standards or guidelines."[65]

In neither the historical board minutes nor the NETS archival data is a correlation identified between the standards project and ISTE's interest in expanding its global reach. However, the majority of board and staff minutes and strategic planning documents do reflect ISTE's struggle with its *international* identity and organizational business goals—as early as the organization's inception in 1979. The focus on the NETS including

[64] Interview with ISTE executive leadership, October 30, 2011.
[65] International Society for Technology in Education (Draft) Business Plan, Draft Printed October 25, 1997.

funding sources, stakeholder engagement, and overall rationale for development was very much to provide a national resource that would benefit schools in the United States, to contribute to bridging the digital divide, and to make schools more globally competitive. It is interesting then, that this very national resource is what ultimately led to ISTE's true entry into the global marketplace for education. This entry was facilitated by increased funding and cooperation from private industry to revise the standards through the NETS Refresh project, which deliberately focused on broadening stakeholder involvement internationally and on creating standards that could serve an international education marketplace. This new focus allowed ISTE to expand their strong international goal and purpose: to serve as consultants and collaborators in establishing international standards through their work with UNESCO, and to assist individual ministries of education in creating their own standards and professional development infrastructure, which has now become part of ISTE's business plan. This international focus on standards has finally answered the question that board members have asked in a majority of board minutes: what would actually back up the 'I' in *International* for ISTE.

SECTION III: PUTTING THE "I" IN *INTERNATIONAL*

> ISTE is an association without borders, committed to improving learning and teaching worldwide. From harnessing best practices in educational innovation to embracing working partnerships with private, public, and government entities, ISTE and its members seek purposeful ways to engage forward-thinking educators and education leaders for a broad, global reach and meaningful local impact.[66]

[66] 2010-2011 ISTE Annual Report, "Unlocking Potential."

From the start, having the word, *international* as part of ISTE's organizational identity has been a point of debate among board and staff members. Initially, the question of including an international reach, rather than limiting activity to the United States, seemed relevant because of the large membership base that reached outside of Oregon and into Canada and Australia. Early board minutes from 1986 note, in fact, that although the U.S. membership base was continually in decline, memberships in Canada continued to grow. Early on, there were debates on whether or not to open an ICCE office in Canada.[67] In the majority of subsequent years, however, board minutes note the struggle that ISTE board and staff has had in trying to identify what it is that makes them international; how they can broadly and meaningfully contribute to the improvement of education and the field of education technology in an international way. Board minutes reflect individual board members' interests in or commitment to international involvement; it is this individual interest that appears to have most influenced ISTE's international activities up to the NETS Refresh. ISTE staff did not have the bandwidth to engage deeply in international business until ISTE created a CEO position out of the Washington D.C. office and endowed the responsibility of growing ISTE internationally to that position. Between 1987 and 2000, international discussions centered only on individual board member involvement, either personally or professionally, with international agencies or efforts. There are many examples of various board members serving on a small international committee to find ways to engage in international conversations, collaborative efforts, and conferences. Reports from the committee

[67] ICCE Board of Directors Minutes, 1986.

surfaced intermittently to note successes or failures in various international engagements, but the conversation remained the same: Should ISTE do International work and, if yes, what would it look like?

Beginning in 1987, the focus was to develop ISTE's presence through international conferences focused on education technology. Board minutes continually document ISTE's expertise and success in managing the National Education Computing Conference (NECC), now the ISTE conference. Because of this success, the board appeared to be comfortable exporting this knowledge and to support similar efforts internationally. As with its struggle to determine its U.S. clientele, similar debates are documented in trying to identify their primary international audience. When referencing how ICCE could strengthen ISTE's international role and visibility, the board discussed the purpose of hosting an international conference.

> A truly international conference whose roots lie with the teacher or instructor rather than with the researcher or developer farther removed from the learning process–no international conference currently reflects this orientation…. The conference emphasis is on learning and collaborating in the global village: How can effective educational ideas involving information technology be shared and transferred? In addition, a subsidiary goal of the conference is to increase ICCE's visibility and reputation as a leading international professional society for the application of computers to education [with a side note that they need to find corporate sponsorship to support ICCE teacher members who want to attend].[68]

This perspective was challenged by an executive staff member, who responded,

> …where [I have] trouble is whether the committee calls it a conference, symposium, meeting…what does the committee want to accomplish? Identifying ways you can cooperate and help the world internationally by

[68] ICCE Board of Directors Minutes, 1987.

> getting key people together is much more important that the concept of raising money for teachers from parts of the world to get together. Therefore, focusing on something closer to a symposium or working session with very distinct ideas in mind of what you want to accomplish.[69]

The board has continually struggled with the purpose, mission, and method for engaging in international work and in having an international committee as part of the board. Successes are documented, in various years, with ICCE and ISTE largely supporting international conferences by co-hosting sessions and helping to collaborate on conference organization efforts. Setbacks and negotiations regarding international purpose and engagement are documented by the international committee in board minutes year after year. Challenges range from corporate sponsorship denial because of international software copyright fears, difficulties in language translation, dealing with the fact that teachers in developing countries cannot afford conference fees, and conflicts about how ISTE and various countries view membership-based organizations. Data show ISTE trying out various aspects of international engagement—from building up an international membership base to engaging in UNESCO-sponsored conferences and meetings—but they were not able to work through the challenges to make these efforts stick. It appears that this lack of consistency and success is caused by difficulty in overcoming these key challenges in addition to an ever-evolving board and its personal involvement and commitment to the international committee. This, in addition to the factors of having a volunteer board, limited funds, lack of clear international mission, and

[69] ICCE Board of Directors Minutes, 1987.

a small overextended staff, kept ISTE shuffling to find their place in the international education.

In 1999, several significant issues were noted in the board minutes. Membership numbers had increased, as had book and courseware sales. These increases were attributed to the publication and increased marketing efforts of the NETS.[70] In 2000, board minutes reflect continued increase in sales of all NETS-related derivative products that included print and professional development training and consulting. Additionally, during this time, ISTE acquired full ownership over the NECC conference, whereas before they were simply partners responsible for coordinating this large and financially successful annual event. This conference acquisition, combined with the creation and promotion of the NETS, helped ISTE gain wide visibility in the education community. As one of ISTE's executive staff explained, the conference "move[d] ISTE into the real mainstream…made us a schoolhouse word. And it gave us the ability to open the DC office to have advocacy as a major agenda of ours."[71] This visibility, along with hiring a CEO, developing an advocacy office in Washington, D.C., and the NETS development process itself (which involved broad stakeholder engagement and consensus-building), finally provided ISTE an entry point into the realm of international education. What began as a nationally focused effort—developing *national* standards for education technology, funded largely by the U.S. federal government—had evolved as a tool or mechanism for ISTE to expand its international business. When it comes to answering the

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70 ISTE Board of Director Minutes, 1999.

71 Interview with ISTE executive leadership, October 30, 2011.

second part of my first research question, *In what ways have technology standards and expectations of technology in education been facilitated by ISTE internationally?*, we can look to the broad international standards-based collaborative and consultative efforts that ISTE has been engaged in since the mid-2000s and the NETS Refresh effort in 2006.

Internationalizing the Production of Education Technology Standards

In two separate interviews with ISTE leadership, an important point was raised regarding ISTE's involvement in developing education technology standards internationally: that developing the NETS was the start of a *conversation* among education stakeholders.[72] From this perspective, international partners can use the NETS as a starting point for negotiating their own expectations for how and why their education systems should focus time and money towards technology integration. To accomplish this customization, education ministries from around the world pay ISTE as a consultant, not only to help them generate their own version of the NETS but to learn about the process that ISTE followed in developing the NETS. Alternatively, education ministries can hire ISTE to facilitate the broad stakeholder negotiation process themselves. The rhetoric, focus, and emphasis surrounding the NETS now is that they are less about technology in and of itself and more about addressing what students, teachers, and administrators need to know and do to be successful in the digital age—which just happens to include the integration of technologies. ISTE has offered a variety of professional development training and consultant services surrounding the NETS since their initial development.

[72] Interview with ISTE executive leadership, 10/13/11 and 10/30/11.

However, it was with the NETS Refresh between 2006 and 2009 that ISTE began expanding and validating its international business activity by renaming the NETS, for discussion of standards outside the United States, to ISTE's *Global Digital-Age Teaching, Learning, and Leadership Skills.* ISTE was very deliberate in their efforts to include and expand their corporate partners and international stakeholders in the NETS Refresh process to ensure that the language and the focus on digital-age and twenty-first-century skills were central to the standards. This new alignment helped ISTE achieve several things: It opened the door for more international standards consulting, for more corporate support, and for more collaboration with UNESCO in its development of the International ICT Competency Standards for Teachers. The NETS provided a foundation for ISTE to start international conversations about standards and allowed ISTE to share its development process expertise.

International Standards Consultancy

The commitment to ISTE's international expansion has been an established priority of the board for the past five terms, since the NETS Refresh project in 2007. Determining how and in what ways to expand ISTE's international reach and align these efforts to the organization's mission has been a key goal for the organization from both a national and an international perspective.

> …when we come back from each one of those [international experiences], our credibility here in the US is ramped up because we can talk about the difference between the really prescriptive Singapore plans versus some more organic support for technology like Estonia where they say we're going to give everyone bandwidth because we think that will help education. Or, Korea where they are heavily putting content online and are

> reaching every child with distance learning opportunities. So being able to talk about those different models is important…often now when I get asked to speak they want the global perspective. They want me to help them understand where they stack up against what others are doing. Now one of the priorities the board has set is creating a global policy environment supportive of improved learning through technology…. It is a lot to define.[73]

Although ISTE continues to grapple with what it means to create an international policy environment to support education technology,[74] it has begun expanding its reach through a variety of efforts. Since the Refresh project, ISTE has been in the business of providing consulting and teacher professional development services to a variety of education ministries around the world, including India, China, Mexico, Brazil, Costa Rica, Malaysia, the Arab Bureau of Education, and the Philippines. The types of consulting services, described to me in an interview with ISTE executive staff,[75] vary. In the case of Costa Rica and Malaysia, for example, ISTE worked with education leaders from those countries, following the ISTE development process of engaging a broad base of their key stakeholders, to develop a set of customized standards. ISTE worked with the Refreshed NETS, or the *Global Digital-Age Teaching, Learning, and Leadership Skills*, as a foundation to help the countries' leaders select their own priorities and frameworks for developing their standards, but it used the same language that focuses on digital-age and twenty-first-century skills required for personal and professional success. The process for Mexico differs in that the education ministry wants ISTE to work directly with local groups, using the standards to help professionalize teaching. In this case, ISTE

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[73] Interview with ISTE executive leadership, 10/30/11.
[74] Telephone interview with policy leadership at ISTE, November 2, 2011.
[75] Interview with ISTE executive leadership, 10/30/11.

is negotiating with this group to help them struggle with their own process instead of delivering the service directly. The work ISTE is doing with the Philippines on standards development is focused more on helping them learn how to adopt the standards directly because their interest lies in creating an exportable market of teachers who can teach anywhere in the world. In this case, the Philippine government is making a concerted effort to develop a trained professional workforce, armed with twenty-first-century skills including fluency in English and proficiency in technology usage, which can generate significant remunerations back to the country. The Philippines currently exports their teachers to China because of their English-speaking abilities; they feel that, with further professionalization surrounding technology, they will beat out other countries' competition. In addition to providing consulting services for standards development, ISTE also provides international professional development services.

Through a blended offering of online, face-to-face, and combined trainings, ISTE has focused its training efforts on assisting teacher leaders or mentors so that they can then train the teachers under their charge. These types of teacher-leader trainings range from learning how to use specific technologies to understanding concepts such as digital literacy. In the United States, for example, ISTE worked with the State of Pennsylvania to train Instructional Technology Coaches across the state to help them implement their one-to-one laptop program. In Singapore, ISTE helped education leaders design and implement an ICT coaching model: they identified 700 teachers who were then each responsible for helping two other teachers to learn and acquire digital skills that align with the standards.[76] ISTE works with international education ministries directly to establish goals for localizing standards efforts, and it also works with other corporate partners to influence change (see Table 3).

Table 3: Examples of ISTE International Project Collaboration[77]

Country	**Project Goal**
Singapore	Design and implement ICT coaching model
India, China, Brazil	Advise schools, districts, states, regions, and countries in ICT standards development
Cost Rica	Shared leadership between ISTE and foundation to develop ICT standards
Malaysia	Shared leadership between ISTE and ministry of education to develop ICT standards
European Council of International Schools and the Association for the Advancement of International Education	Leadership Development at conferences and leadership events
Bermuda, Costa Rica, Ghana, the Philippines, Singapore	Ministry of Education leadership training
International Schools: Brazil, the Netherlands, Mexico, the Czech Republic, Germany, Qatar, Switzerland, the United Arab Emirates	Leadership training and assistance
Corporate partnerships for international standards development	*Intel Teach Program*; Microsoft *Partners in Learning* initiative; Certiport *IC3 Certification*; Oracle Foundation *Think.com* resources; Hewlett Packard's Division of Global Social Innovation
UNESCO collaboration	Partner and member of board for developing international ICT standards: *ICT Curriculum Framework for Teachers*, workshop trainings in Uruguay
U.S. Department of Defense Contract	Training ICT and Ed Tech specialists in schools across Europe
State-Province Level Training: Australia, Brazil, Canada, China, Mexico National ministries: Brazil, Costa Rica, China, Jamaica, Bermuda, Mexico, the Philippines	Strategic planning and visioning for the future and advancing digital-age education
China, Singapore, Dubai, Australia, India, the Netherlands, the UK, Saudi Arabia	Networking events and Community Building: conferences, summits, symposia and forums

[76] Consultant services are communicated to potential international clients via handouts. Some information noted here was gleaned from two handouts titled, "Meet ISTE" and "ISTE Global Consultancy Services for Developing Standards for ICT and Ed Tech in Schools."

[77] Data found in *Meet ISTE* marketing handout and the 2010-2011 Annual Report *Unlocking Potential*

Internationalizing the NETS: ISTE Corporate Collaboration

In ISTE board minutes through the early 2000s, corporate collaboration largely meant seeking funding or sponsorships in exchange for visibility in ISTE conferences and publications. Although corporate partners collaborated with ISTE by hiring staff as consultants for developing products and professional development, participation in membership-like activities was limited. ISTE has attempted, over the years, to create various types of corporate membership and sponsorships to help generate revenue for the organization. Through the new ISTE Corporate Membership option, now with 62 corporate members, private-sector stakeholders can now pay to join ISTE as an active part of the membership; corporations can also join Special Interest Groups and other ISTE networks, and can collaborate and participate in organizational functions and conference offerings, just as individual and organizational affiliate members can. Additionally, corporate partners can get discounts to advertise to ISTE membership and get special visibility at ISTE conferences. As noted previously, in an interview with ISTE corporate leadership, it was noted that

> ISTE believes strongly that we want to have a good relationship with corporations and companies selling to the ed-tech market because they are part of the solution. So, that public-private partnership is really important, and ISTE wants to be seen as a leader in that regard in fostering those relationships without endorsing products…. Fostering these relationships and bringing these companies in front of our members is part of our mission.[78]

[78] Telephone interview with ISTE corporate relations leadership, November 2, 2011.

During an interview with ISTE leadership,[79] it was recognized that some members have considered this close relationship with the private industry to be problematic because it has too much influence over the direction of ISTE. Despite some of these claims, however, an executive from ISTE stated that ISTE works hard to be an equal opportunity organization that approaches business involvement in a neutral way and that represents a variety of stakeholders to accomplish ISTE's goals. Additionally, it was noted that the strategic direction of ISTE is determined solely by board members and staff; working with private industry is beneficial in other ways, such as engaging corporate partners as a way for members to learn about resources and services, for ISTE to consult for businesses product development, for corporations to get member feedback, to generate revenue, to keep conference costs low for members, to help fulfill its mission, to expand its international reach, and to promote the dissemination and adoption of the NETS. Additionally, it was shared that close involvement with corporate partners helps to "advance excellence with innovative uses of tech in the classroom. Corporate members contribute to ISTE in more than the member dollars–they use membership as sounding boards for product development, some participate in the seal of alignment program which aligns products to the NETS; which is a rigorous process. It also benefits members so they know what to buy, and focus groups serve as sounding boards by corporate groups–informal groups–to give corporate members access to what's going on in the field."[80] Financially, the organization does not generate a significant amount of revenue from

[79] Telephone interview with ISTE corporate relations leadership, November 2, 2011.
[80] Telephone interview with ISTE corporate relations leadership, November 2, 2011.

corporate memberships; the ISTE 2009-2010 annual report notes that all membership levels contributed only 16.6 percent of their total annual revenue of $14,677,146, whereas the conference and exposition revenue contributed 48.6 percent.

To foster and grow its corporate relationships, ISTE has created new ways of involving them, as with the corporate membership program, and is collaborating with them directly to expand its international reach, largely with relationship to the annual ISTE convention and exposition. ISTE's annual conference accounts for nearly 50 percent of its annual operating budget, which is close to fifteen million dollars; with more than 450 vendors that host booths, sponsor events, and offer workshop sessions, this is an important stakeholder sector for the organization.[81] The ISTE conference, as noted on the ISTE website, attracts 20,000 participants from 75 countries. ISTE leadership and conference organizers have made it a priority to accommodate and facilitate a greater international audience. To further extend international memberships and participation in ISTE conferences, ISTE is offering more resources and services to serve the international community at its U.S. conference, including adding more internationally-focused sessions, networking opportunities, and virtual offerings. Additionally, ISTE is collaborating in more diverse ways with corporate and government partners that go beyond typical vendor relationships and instead involve cross-promotion and collaborative planning. One such engagement is between ISTE and the U.S. Department of Commerce and the U.S. Department of Education; the relationship is intended to promote the conference and generate international interest and participation among each

[81] 2010-2011 ISTE Annual Report, "Unlocking Potential."

organization's contacts and stakeholders. ISTE also hosts and co-hosts additional conferences internationally, in collaboration with various corporate partners and government ministries, such as those held in France, China, Singapore, Dubai, and Australia. Such events are modeled after the U.S. conference business model and are customized to address local leadership's needs and expectations. The tie between organizational mission and the responsibility of connecting U.S. corporations to a global market as a way to improve education internationally is another way that ISTE tries to expand work with the standards, engage corporate and government stakeholders, and fulfill its mission of improving education through technology. One such example of this is the creation of a "Global Forum" at the 2012 ISTE conference.

> [O]ne of the strategic goals…is to take a global perspective on whatever it is ISTE is trying to do, to advance excellence in education globally. It's not just the U.S. but all children should have the opportunity for an education that will prepare them for the world they are living in now and working in the future. So, there were plans internally…for a global trade forum for ISTE 2012…. [I]nternal stakeholders are working on this internally and…I am going to actively engage the corporate members in planning that trade forum.... What they are looking for and the whole point of the global forum is to bring in high-level ministry of education people from around the world, put them in front of companies selling solutions, and to talk about these solutions and how they can be globally applied and obviously possibly lead to generating some business for our U.S.-based companies to export U.S. technology. So, the first thing I'm doing is putting together an advisory board of corporate members to really help us put this forum together. They didn't come up with the idea and they won't have a real role in the execution of it, but they will in the planning of it.[82]

Although the corporate membership option and activities like the Global Forum at the U.S. ISTE conference are more recent activities, ISTE has long worked for and with

[82] Telephone interview with ISTE corporate relations leadership, November 2, 2011.

corporations to consult in the creation of resources and services for teacher training that aligns to the NETS. For example, ISTE has had a partnership with Hewlett-Packard (HP) since 2003 to provide not only NETS-aligned teacher training resources, but also to conduct face-to-face professional development training in Canada, the United States, Mexico, Colombia, Costa Rica, India, and Singapore. Additionally, corporate partners Intel, Microsoft, and Oracle have all collaborated with ISTE to create resources and services and to expand their international reach and the adoption of education technology standards through each of their own programs and initiatives. These same corporate partners helped sponsor the NETS Refresh project in 2007 and also now serve alongside ISTE leadership on the UNESCO advisory board for developing international ICT competency standards for teachers. This congruency between ISTE, UNESCO, and their corporate sponsors allow each stakeholder group to work together to investigate problems and find solutions to the challenges educators face when attempting to integrate ICTs effectively into instruction. Each institution brings to the table a variety of viewpoints, experiences, and expectations of their constituencies. This alignment helps move forward these initiatives because each type of institution brings different strengths to the partnership. When organizations collaborate at such a level, synergies become more apparent, and the narrative begins communicate a common agenda for all stakeholders. Creating national and international standards and expectations for ICT use in education has allowed private and public interests to create a common narrative and a common goal. With a common vision, these stakeholders are more likely to reach their goals and to perpetuate their narrative; this, in theory, can help create positive change for teachers and students across the international education spectrum. However, when we review the trends of educational achievement and the integration of instructional technology into education overall, we see little improvement despite concerted efforts over the past 30 years, especially among poor communities. Although the focus on standardizing benchmarks or expectations for ICT integration is a way to create a common language and common goals among the stakeholders, it detracts from more critical dialogue that can help solve deeper socioeconomic challenges that continue to plague education and prevent teachers from accomplishing what is expected of them in the classroom. For example, if you compare the editorial content from ISTE's member journal from 1979 to 2011, a noticeable trend appears post-NETS development: content in the journal is anchored around themes of the NETS. By anchoring the journal content around standards expectations, the default is to recognize only the positive nature of ICTs in education, excluding critical examination of why and how it is not working for everyone and neglecting the exploration of why it is not being widely adopted across education.

Additionally, when reviewing board notes after ISTE was restructured to include a new CEO, ISTE as an organization becomes more focused in terms of their business strategy, focused on the NETS as a way to expand their reach to international development. Before the NETS, the ISTE board struggled with finding ways to be truly international in scope. The NETS and standardization movement allowed them to enter this space and expand their expertise in this area. Although this opened the opportunity to assist education ministries in creating their own set of standards and to collaborate with UNESCO on creating an international benchmark for expectations, it takes away from the organization's ability to explore other avenues for progressive change. As a nonprofit organization, ISTE is in a precarious situation: On the one hand, they are driven to fulfill their organizational mission of working to promote integration of technology to improve education; on the other hand, they are driven by the stakeholders around them that supply them with national and international expectations as well as private interests. This dance among partnering institutions excludes the broader stakeholder participation of educators who do not see, or cannot realize, the benefits of technology in their classroom for reasons that are beyond their control. What is seen in the board minutes is a struggle among board members to engage ISTE in international activities that are related to the board's varied interests and experiences but that do not provide economic benefit or a long-term business strategy. However, after the NETS were funded and the effort was established, it allowed ISTE to have an anchor nationally and internationally. Although the annual conference continues to provide a breadth of resources and services to its member base and affiliate organizations, the focus of the organization, in terms of its expertise and reputation, is squarely on the standards movement and preparing teachers for success in reaching these benchmarks. This focus is well intended but limiting in terms of ISTE's ability to think outside the NETS. ISTE's focus on the NETS inhibits them from using their advocacy network for progressive changes in education that go beyond the standards and into the deeper inequities reflected in the classroom—the more difficult challenges of pulling into the culture of production those teachers who are not yet convinced or have not been given the opportunity to see the value of using technology for instruction.

UNESCO: International ICT Competency Standards for Teachers

> …the "Competency Standards" will constitute a common core syllabus defining various ICT competency skills for teachers that professional development providers can use to prepare learning materials, which can be shared at a global level. In addition to providing a basic set of qualifications that allows teachers to integrate ICT into their teaching, the standard also aims at extending teachers' professional development so as to advance their skills in pedagogy, collaboration, and school innovation using ICT. Finally, the standard will harmonize different views and vocabulary regarding the uses of ICT in teacher education.
>
> While the new UNESCO standard specifies the competencies needed to implement these changes, it will be up to approved governmental, non-governmental, and private providers to deliver the training for these competencies. The project also includes a mechanism for reviewing and approving the curricula and course offerings of these providers.[83]

Similar to the ISTE rationale for developing the NETS to address the digital divide and meet the needs of the digital age, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) began the process of creating international ICT standards through a collaborative process with key players in the field.[84] It was noted in an interview with ISTE executive staff[85] that because many members of UNESCO were resistant to U.S. participation in international dealings, and because of anti-U.S. sentiment, ISTE did not participate directly in early ICT competency standards development. Additionally, it was important to UNESCO to make the effort as much of a global project as possible without giving the appearance that it was a U.S.-focused

83 Quote taken from UNESCO Communication and Information website, "Work on UNESCO's ICT Competency Standards for Teachers enters final phase." Accessed on 2/15/12, http://portal.unesco.org/ci/en/ev.php-URL_ID=23023&URL_DO=DO_TOPIC&URL_SECTION=201.html

84 UNESCO's ICT Competency Standards for Teachers website. Accessed on 2/15/12, http://cst.unesco-ci.org/sites/projects/cst/Lists/Project%20Development/DispForm.aspx?ID=1&Source=http%3A%2F%2Fcst%2Eunesco%2Dci%2Eorg%2Fsites%2Fprojects%2Fcst%2Fdefault%2Easpx

85 Interview with ISTE executive leadership, October 30, 2011.

project. Despite the effect these decisions might have had on ISTE's early involvement in the process, the UNESCO team used the foundation NETS for teachers as the starting place for developing the international ICT competencies. UNESCO and its corporate partners decided that the NETS were situated at too high a level and were not relevant to poorer countries, so they set out to create a different framework that focused on developing a progression of competencies ranging from not skilled to highly skilled in ICT literacy, knowledge-deepening, and knowledge-creation. Tables 3 and 4 outline how the standards were changed in the revision process for both students and teachers which can then be compared to Figure 1 which highlights the UNESCO ICT teacher competencies which were derived from the revised NETS standards.

Revising the Educational Technology Standards for Students

Table 4: NETS-S Categories

NETS-Students 1998	**NETS-Students 2007**
Basic Operations and Concepts	Creativity and Innovation
Social, Ethical, and Human Issues	Communication and Collaboration
Technology Productivity Tools	Critical Thinking, Problem-Solving and Decision-Making
Technology Communication Tools	Research and Information Fluency
Technology Research Tools	Digital Citizenship
Technology Problem-Solving and Decision-Making Tools	Technology Operations and Concepts

Table 5: NETS-T Standards and Performance Indicators[86]

NETS-Teachers 2000 *All classroom teachers should be prepared to meet the following standards and performance indicators.*	**NETS-Teachers 2010** *ISTE's NETS for Teachers (NETS•T) are the standards for evaluating the skills and knowledge that educators need to teach, work, and learn in an increasingly connected global and digital society.*
Technology Operations and Concepts	Facilitate and Inspire Student Learning and Creativity
Planning and Designing Learning Environments and Experiences	Design and Develop Digital Age Learning Experiences and Assessments
Teaching, Learning, and the Curriculum	Model Digital Age Work and Learning
Assessment and Evaluation	Promote and Model Digital Citizenship and Responsibility
Productivity and Professional Practice	Engage in Professional Growth and Leadership

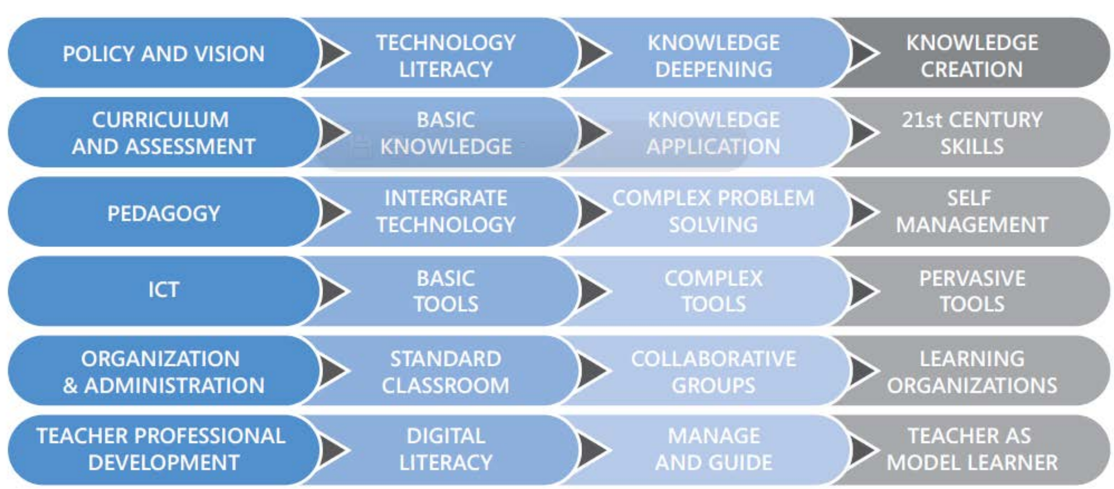
The focus of both the NETS standards for teachers and the UNESCO ICT competency standards focus on building teacher proficiency in using ICTs for instruction. The standards are a progressive move from expecting teachers to instruct students how to use technology as a tool, to instead integrating technologies as part of the learning process. This use of technology changes the paradigm of teaching and learning–it invites teachers to become facilitators who guide student-directed learning instead of being experts or conveyors of knowledge. Instead of creating one set of standards as ISTE did for the United States, UNESCO developed a progression of expectations to fit the diversity of nations for whom the ICT competencies were intended. The UNESCO matrix for the ICT competency standards demonstrates this shift in thinking about how technology shifts teachers' roles in education (see Figure 1).

[86] Accessed from ISTE website on May 1, 2012, http://www.iste.org/standards/nets-for-teachers.aspx.

By crossing the three approaches to education reform based on human capacity development—technology literacy, knowledge deepening, and knowledge creation—with the six components of the educational system—policy, curriculum, pedagogy, ICT, organization, and teacher training—a curriculum framework is created for the UNESCO ICT Competency Standards for Teachers (ICT-CST) project. Each of the cells of the matrix constitutes a module in the framework. Within each of these modules, there are specific curricular goals and teacher skills…

The intent is that providers and educators will review the curriculum framework and the competency standards with an eye to developing new learning materials or revising current materials so as to support one or more of the three approaches. In parallel, providers and educators can comment on the draft competencies, enabling the community to collectively shape the standards. The first component—policy and vision—is used as a given in the ICT-CST framework. That is, it is assumed that a country is starting with one or more of these specific approaches to education reform based on their economic and social development goals. However, once an approach has been selected, each has different implications for other components of the education system and for teacher professional development programs.[87]

Figure 1: UNESCO ICT Curriculum Framework for Education Reform[88]



87 Accessed from UNESCO ICT website, My 1, 2012, http://cst.unesco-ci.org/sites/projects/cst/The%20Standards/ICT-CST-Competency%20Standards%20Modules.pdf
88 Accessed from UNESCO ICT website, May 1, 2012, http://unesdoc.unesco.org/images/0015/001562/156207e.pdf.

Table 6 outlines the various levels of teacher competency required for ICT usage and aligns these to a variety of policy options for countries to select depending upon their needs and goals.

Table 6: UNESCO ICT Competency Standard Examples by Level

Competency Level	**Policy and Vision**	**Examples of Teacher Skills**
Technology Literacy Approach	To prepare learners, citizens, and a workforce that is capable of taking up new technologies so as to support social development and improve economic productivity. Related educational policies goals include increasing school enrollments, making quality resources available to all, and improving basic literacy skills, including technology literacy.	Teachers must be aware of policies and be able to specify how classroom practices correspond to and support policy. Teachers must know basic hardware and software operations, as well as productivity applications software, a web browser, communications software, presentation software, and management applications.
Knowledge Deepening Approach	To increase the ability of the workforce to add value to society and the economy by applying the knowledge of school subjects to solve complex problems encountered in real-world situations of work, society, and life.	Teachers must have a deep knowledge of national policies and social priorities, and be able to design, modify, and implement classroom practices … Teachers must be aware of a variety of subject-specific tools and applications and able to flexibly use these in a variety of problem-based and project-based situations. Teachers should be able to use network resources to help students collaborate, access information, and communicate with external experts to analyze and solve their selected problems. Teachers should also be able to use ICT to create and monitor individual and group student project plans.
Knowledge Creation Approach	To increase productivity by creating students, citizens, and a workforce that are continually engaged in and benefiting from knowledge creation and innovation.	Teachers must understand the intentions of national policies and be able to contribute to the discussion of education reform policies and participate in the design, implementation, and revision of programs … Teachers must be able to design ICT-based knowledge communities and use ICT to support the development of students' knowledge creation skills …

After UNESCO solicited feedback from their project stakeholders, ISTE was looped into the project. ISTE executive leadership noted that

> …when they began to get feedback, they were having trouble getting consensus and making final decisions so they asked ISTE to come in as a consultant. They used standards to start their project, but couldn't build consensus, so then they pulled ISTE in as consultants on process and to render those down for publication…. ISTE has a strong history and reputation with the standards; being able to negotiate what they mean, why they have them, etc.[89]

ISTE and their funding partners began to play a stronger advisory role in the UNESCO process at this point in the international standards development; both ISTE and UNESCO have contributed to the standards process and products. For example, ISTE played an advisory role in developing the international competencies, and UNESCO helped ISTE establish a new foundation of the NETS, revising them to fit international expectations for instructional technology reform. The same corporate partners that supported the international competencies were also responsible for funding and supporting the development of the refreshed NETS. All parties now also currently serve on advisory boards and collaborate on developing international support for educational technology in education. In November 2011, the CEO of ISTE was appointed to the governing board of UNESCO's Institute for Information Technologies in Education (IITE) for a two-year term. Also in 2011, the Competency Framework for Teachers was updated from the original version published in 2008; the publishing site notes that this update "…is the result of the successful continued partnership between UNESCO and

[89] Interview with ISTE executive leadership, October 30, 2011.

CISCO, INTEL, ISTE and Microsoft. In this version, the Framework has been enriched on the basis of feedback from subject matter experts and users worldwide, and enhanced with the inclusion of example syllabi and exam specifications..."[90]

In addition to the updated competency standards, ISTE, UNESCO, and their corporate partners also created an Alignment Program fashioned about the NETS alignment service that ISTE provides. With this service, companies pay ISTE to review their resources and services, through a blind-review process; if the product aligns to the NETS, it receives a seal of endorsement for having incorporated the standards effectively. ISTE and the other competency standards partners are in the process of creating similar programs which, as presentation notes show, are "[d]esigned to verify and measure a resource's alignment to the UNESCO ICT Competency Framework for Teachers [and serve as a] resource users or potential users know it can help them achieve the ICT-CFT Curricular Goals."[91] A majority of the UNESCO websites that address ICTs in education and the competency standards use language and rhetoric similar to what ISTE does to justify the need for integrating technology into education: to address the digital divide, to provide a level playing field in education, to provide equitable access to information, and to prepare students for challenges presented by the digital age.

Although the NETS standards have not been adopted verbatim internationally, the narrative surrounding the need for education technology standards, as well as the process for creating them, is being replicated in individual education ministries' efforts to

[90] Quote taken from UNESCO website. Accessed on 2/14/12, http://iite.unesco.org/publications/3214694/.
[91] Quote taken from an ISTE PowerPoint presentation handout, "UNESCO ICT Competency Framework for Teachers Alignment Program."

standardize thinking around ICTs in education; in private industry's ability to profit through international education business expansion based on standardization of product expectations; and in the efforts of international agencies like UNESCO to support private and public interests to leverage increases in educational development internationally. The cultural production of the education technology standards product and process have been created, cycled, and recycled through ISTE and ISTE's government, corporate, and international agency partners and continues to be circulated among education ministries and education stakeholders internationally. Determining whether or not this method of cultural production of instructional technology in education has proven effective in making changes in technological equity and efficacy in schools across the United States and internationally–and in addressing issues of the digital divide—has yet to be seen. What *is* in alignment internationally is a stakeholder narrative that is produced and circulated among those focusing on standards development. It is a logical move in terms of business strategy and education reform efforts to create international standards that develop a common language and common benchmarks among educators and private companies that supply them with products. However, without policy that guarantees a minimum level of ICT infrastructure and ongoing technical support for every teacher's classroom, these standards will be impossible for teachers to live up to. Without monetary backing and government enforcement for these infrastructural support systems—and without taking into consideration the myriad social challenges that teachers face in the classroom—reform through the application of technology is simply something that can be discussed and not achieved.

Teacher professional development is at the heart of the instructional technology standards movement; it has been widely recognized that teachers are at the heart of successful reform. Without incentives at the classroom level, and without the buy-in of teachers who see the value of ICTs in helping them solve day-to-day classroom problems, these initiatives will fall flat. The focus on international standards development and where teachers should be, in terms of a level of ICT usage, detracts from the inequities that exist outside the control of the classroom teacher.

SECTION IV: FRAMING INSTRUCTIONAL TECHNOLOGY IN EDUCATION

Introduction

This section explores the second key broad research question of this study, "In what ways has institutional discourse of ICTs in formal education changed over time?" This is investigated with the intermediary question: "How has ISTE's discourse, related to ICTs in education, been framed since its founding in 1979?"

> ***1974, The Next Great Crisis in American Education: Computer Literacy***[92]
> Today, statistical indicators show that the United States is fast being overtaken in innovation of new technology by more dynamic foreign economies. Our technological lead in computing, which some feel offers the best solution for increased national productivity, is also waning…. A number of foreign governments are now working cooperatively with commercial firms and educational institutions in their countries to mount a challenge to our leadership. They are investing large sums of money into research and development of computer-based industries. More significantly, they have placed a high priority on the development of computer-based skills in their educational systems. The key to the success

[92] Article featured in *The Oregon Computer Teacher* in 1974, "The Next Great Crisis in American Education: Computer Literacy," pp. 33-43.

of this technological challenge lies in adopting new educational methods which make the computer an integral part of the educational process from kindergarten to the university and which permit people to experience computer uses and practices on a day-to-day basis…. [I]t is evident that the problems of the economy, science, education and the computer are all interdependent and highly related…[a]nd international competition for the lead in knowledge based industries is likely to increase in the near future (p. 36).

2012, The Education Crisis Is a National Security Crisis[93]

Today…as America's young citizens are simultaneously confronted with growing economic inequalities and an increasingly global and competitive world, elementary and secondary (K-12) schools are failing to provide the promised opportunity. Measured against global standards, far too many U.S. schools are failing to teach students the academic skills and knowledge they need to compete and succeed (p. 3).

International competition and the globalization of labor markets and trade require much higher education and skills if Americans are to keep pace. Poorly educated and semi-skilled Americans cannot expect to effectively compete for jobs against fellow U.S. citizens or global peers, and are left unable to fully participate in and contribute to society. This is particularly true as educational attainment and skills advance rapidly in emerging nations (pp. 7-8).

Working with computers is not a skill of the future. Like science, it is decidedly a skill of today, which is fundamental to protecting U.S. physical security and secrets as well as to allowing U.S. businesses to innovate and grow…The Task Force recommends that technology expectations be thoroughly integrated with math, literacy, science, and foreign language curricula so that students learn how they might effectively apply technological skills in diverse and constantly evolving settings. Students should graduate from high school with technological dexterity; able to understand and work with hardware, software, and networks; and able to use technology to find and process information, fuel creation and creativity, and collaborate and communicate with others (p. 46).

In education, it is hard to point to examples of successful and sweeping innovations that have changed the way schools are structured, the way

[93] Independent Task Force Report #68, *U.S. Education Reform and National Security,* released by the Council on Foreign Relations, 2012.

> teachers teach, and the way students learn…by 2008, all public schools in the United States had at least one instructional computer with Internet access; the ratio of students to computers was about three to one...computers and digital technology have thus far not been used innovatively to change the way the United States educates its students, but instead simply to reinforce past practices (p. 32).

While attending a recent conference that focused on highlighting and facilitating discussions to encourage innovations in learning, I was struck by the fact that the conversation, questions, and concerns surrounding integrating technology in education have not significantly changed. Sessions highlighted the need to develop new twenty-first-century educational infrastructure to foster authentic learning, critical thinking, problem solving, and creativity among students, teachers, and administrators, how to use gaming to reach kids, and how to incorporate project- or challenge-based learning to offer authentic learning experiences and assessment for students. Given the urgency surrounding education to account for technology's role in fostering greater economic and international competitiveness, more authentic and personalized learning opportunities for students, and an overall restructuring of the educational system, one might think that we are on the cusp of a serious crisis that must be addressed immediately. This crisis—and the rationale that sustains it as well as the solutions proposed to solve it—is, perhaps surprisingly, not new.

To analyze my second research question, *How has ISTE's discourse, related to ICTs in education, been framed since its founding in 1979*?, I examined the International Society for Technology in Education's (ISTE) teacher-oriented journal for members. The journal has been published since 1974; it began as the *Oregon Computing Teacher*, then became *The Computing Teacher*, and evolved into the current journal *Learning and Leading (L&L) with Technology*. I examined featured article titles, reviewed the Table of Contents, and analyzed the editorial commentary in journal issues from the years 1974 and 1978, and then from 1979 through 2011. This historical grounding provides the context necessary to frame the need for technology in education, ways that technology affects the education system, problems of and solutions for technology integration, and the perceived role of various stakeholders in facilitating change.

These perspectives are a key part of ISTE's production of education technology culture and reflect ISTE's own internal culture of production. Much like DuGay's (1997b) circuit of culture, ISTE and other stakeholders contribute to the production of this culture, contributing to a share sensed of meaning and purpose connected to identity, production, consumption, regulation, and representation. The accepted meaning, purpose, and expected outcomes for using technology in education are produced and circulated between ISTE and other stakeholders. This can, in turn, influence or affect others that work outside this circuit, such as the expectations set by the NETS. These standards have been adopted across the United States and in many other countries; they influence and are influenced by federal, state, and international policy; and they impact funding decisions, as well as professional expectations for teachers and administrators. The journal, however, which is the focus of the analysis in this section, contributes less to those outside the circuit of production and more to ISTE's internal production of culture. The journal is a membership publication, and these members are part of the stakeholder group that contributes to the circuit of production.

The results of my analysis of the journals show that ISTE has framed a consistent and progressive message and call to action to members for nearly 40 years. ISTE has identified innovative applications for using technology to enhance both teaching and learning and has placed technology at the heart of what is required for broad educational improvements. Through inductive data analysis five themes emerged from the journals: successful ICT integration in the classroom is teachers' responsibility; ICTs are ubiquitous and their usage in education is inevitable; and that teachers can be empowered if provided with access to and training in using ICT. Out of the 58 journal editorials analyzed the following thematic representation emerged:

- 67% highlighted teacher responsibility for successful ICT integration
- 33% recognized ICTs in education as ubiquitous and inevitable
- 16% recognized that lack of infrastructure in schools was a barrier to integrating instructional technology practices
- 14% identified administrative support of ICTs as a key issue to ensuring ICT integration, and
- .5% recognized an existing digital divide and suggested the following as solutions to the problem:
    - Full and deliberate ICT integration across the curriculum
    - Teachers must identify solutions with students in their classes that do not have access to ICTs (find grant money, donations, etc)
    - Computing ubiquity turns digital divide into learning divide and students must be empowered with knowledge on how to use ICTs effectively

A focus of the journals is on placing the power of teaching and learning in the hands of teachers and students, to empower[94] them, on an individual level, with more and

[94] In the May 2011 journal editorial, for example, this notion of empowerment was repeatedly noted, "The potential for positive change is enormous. A mind shift seems to be occurring as more people feel empowered and less encumbered by their fears and other barriers"; "...empower ourselves to get creative and innovative about giving students access to digital age skills"; "...let's stop teaching to the test and start focusing on student interests and needs. Create one authentic assignment that allows students to

better access to information, more authentic learning opportunities, and greater collaboration and communication through the use of technology. ISTE's method of empowerment has been to reach computer-using teacher members and teacher educators by providing them with resources and professional development services with the intent that these best practices will be diffused throughout the system. This diffusion model is noted in the October 1998 journal editorial and is highlighted as a key approach for distributing the NETS and supporting derivative materials with the intent to spread the word through stakeholders involved in the project and through key educational leadership[95]. In the journals, ISTE also identifies the requirements and limitations for successfully integrating technology. In fact, these requirements and limitations set out in journals from the early 1970s are just as relevant to contemporary conversations surrounding technology requirements to support digital age, or twenty-first-century learning.

In the journal editorials, teachers are identified as key factors for why technology is not effectively used for instruction, with reasons ranging from lack of technological literacy, to lack of access to resources, to lack of professional development. Teachers are

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demonstrate their knowledge in unique ways. Let students choose their own tool for the final product, as that allows them to be creative and differentiates learning for them" (p. 4).

95 Reference to Roger's *Diffusion of Innovations* theory is noted in funding proposals and summary reports as the anchor to their approach to dissemination activities surrounding the NETS. For example, in the 1999-2000 final report on the ISTE STAR grant funding, it is noted that "The project's dissemination activities are based on a 'diffusion model' founded in the research knowledge base of the communication and adoption of innovations. Based on the classic diffusion research of Rogers and his colleague Shoemaker (1971, 1983), the literature in the diffusion and adoption of innovations in agriculture, as well as research on educational innovation (e.g. House's classic 1974 study of the spreads of PLATO in Illinois community colleges). The dissemination effort is guided by the projects' Governance Committee (made up of the key stakeholder organizations in K-12 education)" (Final Report Summary, STAR Schools Leadership Grant, #R203U980001 & #R203U990001, p. 6).

asked to take personal action and responsibility to change their instructional practice to accommodate and prepare students for the needs and demands of working and living in the information age. This request includes changing their role from instructor to facilitator and collaborating with students to learn about and with technology. Teachers are asked to engage in formal and self-directed professional development to increase their knowledge and practice in using instructional technology for teaching. Teachers must also learn to help students become life-long learners by teaching them how to problem-solve, think critically, and engage in creative applications of technology to research, solve problems, and communicate ideas. The ultimate goal for student success, it is noted, is their ability to construct their own knowledge of subjects in authentic ways using technology as a tool to help them solve complex problems. Although students might grow up using technology, it is up to teachers to show them how to use technology effectively for problem solving and communicating effectively.

Framing the role of the teacher and the goals of learning outcomes for students is highlighted in journal editorials from 1979 through 2011.[96] The roles and responsibilities of teacher and student in integrating technology in education are represented in and among a variety of themes that included the rationale behind and role of technology in education, technology and structural change in education, requirements for integrating technology in education, and barriers to technology integration in education. The framing of each of these topics has not changed much in the past 40 years, and is consistent with

[96] For examples, see journal excerpt summaries in the appendix II from the years 1979, 1981, 1986, 1987, 1999, 2011.

related contemporary thought around these matters, as reflected in the literature. These identified themes will be discussed in the following sections: “Rationale Behind and Role of Technology in Education”; “Technology and Structural Change in Education”; “Requirements for Integrating Technology in Education”; and “Barriers to Integrating Technology in Education.”

Rationale Behind and Role of Technology in Education

The rationale behind why we must focus our efforts and funding to support technology integration into education today is consistently represented in reports such as those from the Council on Foreign Relations 2012 task force to the U.S. Department of Education’s 2010 National Education Technology Plan. Many elements listed in these current reports are reflected in the ISTE journals dating back to its first issue in 1974. In this earliest issue, the board president included a welcome letter to member recipients explaining that technology was going to change the very notion of what constitutes an education and that technology would be fully integrated into instruction to benefit the United States as a country and its citizens. Likewise, this same issue’s editorial noted that integrating computers in every grade level and across the curriculum would develop computer literacy as a byproduct of using these resources as tools for learning. In the 1978 issue (in place of the editorial, which was absent from this issue), a featured article stressed the importance of technology in the knowledge-based society, explaining that computers have revolutionized the way that businesses and government operate by creating greater efficiencies, effectiveness, and innovation. In education, the article noted, none of those factors is present. The article states that this lack of innovation puts the United States at risk in terms of global competitiveness in properly educating graduates and developing knowledge-based industry opportunities and also results in a lack of innovation in the development of technologies themselves. References to the characteristics of knowledge-based, information-age, and twenty-first-century competitiveness are consistent throughout the journals[97], especially when they refer to students preparing to work in this new global economic infrastructure.

Various journal editorials examine how technology supports students with twenty-first-century knowledge and skills. For example, in the information age, students must be able to solve more complex and interdisciplinary problems; to do so, they must research, analyze, solve, and communicate the problems and solutions. The 1995 ISTE editorial notes that networked computers are better tools for solving such complex problems because they allow students to construct their own knowledge in a contextualized learning environment. Similarly, editorials in 2000 and 2005 note that computer-assisted instruction (CAI) can improve instruction by personalizing and differentiating teaching and learning and, in the process, set higher standards for students to accomplish. Closely related to this rationale for using computers for instruction is the proper use of, or role for, technology in instruction. Since the first issue of the ISTE journals in 1974, the focus of the editorials has been to stress that there are two different approaches for using computers/technology in education. The first is to learn about

[97] For summarized examples, view Appendix II in the years 1974, 1978, 1994, 1995, 2000, 2005, 2007, 2010, and 2011.

computers, as in studying computer science (an approach that is often featured in journal issues as articles); the second is to teach and learn with computers/technology. A majority[98] of the editorials from 1979 to 2010 specifically state that technology should be integrated into instruction and used as an aid to instruction and learning. Technology is represented as being a tool to help solve problems; it is a global library that promotes lifelong learning, fosters critical-thinking, and helps to empower students by allowing them to explore and learn information and communicate their ideas. In each issue, the journals feature stories and lesson plan ideas for integrating technology across the curriculum areas and focus on the perspective that technology is a tool of the information age that supports learners who must acquire knowledge and skills appropriate to succeed in twenty-first-century living.

Two important changes in the ISTE journals happened in the early 2000s. The first is that ISTE developed the preservice teacher education technology standards for teacher certification and began developing the National Education Technology Standards (NETS) and derivative support resources for teachers, students, and administrators. The second important change at this time is that the original editor and founder of ISTE, who had contributed to the editorials between 1974 and 2001, retired from the organization. With this change in leadership, the organization shifted focus and began calling the editorial section of the journal "Issue Oriented," which now provided overall context for the articles featured in each issue. Instead of focusing on education technology issues in

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[98] See summarized editorial journals in Appendix II from 1974, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1992, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2002, 2003, 2006, 2008, 2009, 2010, and 2011.

and of themselves, after 2001, the journal’s editor more frequently tied together specific NETS standards and ISTE resources, along with a synopsis of articles and perspectives featured in each issue. In 2005, 2007, 2010, and 2011, the editorials focused on integrating education standards and technology to support teacher accountability (in accordance with federal regulations) and the notion of fostering digital citizenship in students. In 2005, the journal notes that established standards and technology helps hold educators accountable to providing quality education because information can be entered, stored, and accessed from multiple points in the education system to provide a broad picture of what is happening with instruction and learning outcomes. These findings, in turn, drive decisions for making improvements.

The journals argue that the point is not to be accountable to test scores, but to use technology in ways that motivate learners and engage them in using data and in the learning process. In two issues in 2007 and one in 2010, the editorial focus was on the NETS Digital Citizenship strand and the importance of empowering students and teachers in cyberspace. The editorial viewpoint is that to prepare students for the real world and to help them negotiate appropriate social, ethical, and legal behaviors, teachers must be empowered with digital citizenship themselves so that they can then pass this confidence on to their students. The notion of *digital citizenship* is a standard that grew out of the first set of the NETS and were originally labeled social, ethical, legal, and human issues. Although the emphasis of this standard continues to be on cybersafety and the legal and ethical uses of ICTs, it was expanded to include developing positive attitudes toward technology that are conducive to collaboration, lifelong learning, productivity, and leadership. Given the term *digital citizenship*, we might expect to also see mention of the use of technology for political, economic, or social engagement, but these concepts are not represented. If these issues were included and addressed in the standards, it could be more likely that empowerment would reach beyond cybersafety and into broader issues of equity. This, in turn, could lead to a greater engagement of marginalized communities in efforts to secure greater equity in ICT infrastructure as well as innovative uses for engaging with ICTs to address the challenging social, cultural, and economic realities reflected in schools across the United States and internationally. This lack of critical reflection in the standards indicates the lack of stakeholder focus on these important issues in the production of instructional technology culture.

Developing the idea that the appropriate use of technology can empower teachers and students is also related to the digital divide. A 2002 journal issue argued, for example, that the eventual ubiquitous availability of technology and wireless network connectivity is inevitable; what is important to address now is the learning divide that arises between those who know how to use technology effectively to develop critical thinking and problem solving skills, and those who do not. The focus on empowerment in this case is in knowing how to use the technology effectively to learn, to problem solve, and to communicate and contribute to society. Similarly, a 2001 issue noted that the digital divide problem is a result of the flaws of the education system itself, which is responsible for providing all students with equal access to networked technology. If the districts implemented the NETS standards and integrated technology effectively across the curriculum, technology in schools would bridge the access and learning divide so that all students would be fluent in the use of technology and would be able to learn, problem solve, and communicate more effectively. It is noted, however, that the lack of technology literacy and access in the homes of some students will continue to place them at a disadvantage, much like not having books or being read to affects student success. The 2001 journal noted that the contemporary standards for what constitutes "instructional technology fluency" will continue to evolve and rise, which will perpetuate the divide between school and home. A 2006 editorial advocates for teachers to work directly with students in their classrooms to identify gaps in access and expertise and to seek solutions collectively to these gaps directly; teachers should not wait for administration or funding that might never come to solve the problems.

As noted in other sections, given ubiquitous equal access in schools, technology integration would address the deep learning divide that exists regardless of technology by instituting more personalized learning opportunities for disadvantaged students. Such changes would require structural and systemic adjustments to the current system, changes that both facilitate technology and support technology integration.

Technology and Structural Change in Education

Building on the perspective that modern society has evolved from an industrial to a knowledge-based information society, the journal editorials identify several key structural and systemic changes that technology both influences and is best supported by.

Table 7 shows the difference in educational characteristics as noted within various editorial contexts of editorials from 1974 to 2011.[99]

Table 7: Industrial-Age Education Versus Information-Age Education

Industrial-Age Education	**Information-Age Education**
Behaviorist "Empty Vessel" Learning Theory	Constructivist Learning Theory
Mass Production Instructional Delivery	Personalized Learning
Limited Time Frames of Learning	Life-Long Learning
Learn to Do Specific Job or Skill	Learn to Learn and Solve Problems
Teach to Standardized Tests	Authentic and Performance-Based Assessments
Teacher as Expert Lecturer	Teacher as Facilitator
Instruction	Collaboration
Static Curriculum	Project or Challenge-Based Learning
Individual Learning	Group Collaboration
Basic Separate Curriculum	Interdisciplinary Scaffolding
School-Classroom Border	Borderless Classroom
Isolated Training/Professional Development	Community of Learners, Online, Continuous

The need for structural changes in the education system to facilitate this shift in instruction, curriculum, assessments, and professional development to improve teaching and learning is a theme that is consistently presented across the years. Technology is framed as the way to facilitate a better, more authentic, and personal learning experience for students. To make the best use of technology, teachers must take on new roles as facilitators and collaborators in learning, tackling complicated problems and tasks with

[99] For summarized examples see Appendix II in the years 1974, 1979, 1986, 1987, 1992, 1997, 1998, 1999, 2001, 2003, 2005, 2006, 2009, 2010, and 2011

students, and exploring ways that technology can best address contextualized problems. The editorials express that, by creating a learning environment that allows for student-centric instruction and that provides access to a variety of software, hardware, and networked computers, greater educational outcomes will result and graduates will be prepared to work in the information age and compete in an increasingly global economic workplace. The key to success depends on what ISTE calls *essential conditions*—the physical, human, financial, and policy requirements that must be successfully put into place for technology to be effectively integrated into teaching and learning.

Requirements for Integrating Technology in Education

In 1996, ISTE convened a meeting among the project partners who were responsible for drafting the initial proposal seeking funding to develop the National Education Technology Standards (NETS). The proposal called for development of instructional technology standards, to be accompanied by an additional set of *educational support standards*, now called the *essential conditions.*[100] The proposal noted that these conditions—related to infrastructure, leadership, finance, and policy—are "necessary for schools to acquire and effectively use technology for learning, teaching, and educational management."[101] ISTE has continued to refine and use these conditions with the revision of the NETS and offers them as a guide to schools and districts in their effort to integrate effective use of technology.

[100] To view full descriptions for each category, visit http://www.iste.org/standards/nets-for-students/nets-for-students-essential-conditions.aspx

[101] Located on page 4 of *A Proposal for the National Educational Technology Standards (NETS) Project.*

Here are ISTE's essential conditions for successful integration of instructional technology:

- Shared vision
- Empowered leaders
- Implementation planning
- Consistent and adequate funding
- Student-centered learning
- Curriculum framework
- Technical support
- Ongoing professional learning
- Equitable access
- Assessment and evaluation
- Engaged communities
- Support policies
- Supportive external context
- Skilled personnel

These essential conditions align with different aspects of the information-age perspective discussed in the journal editorials outlined in the preceding section. Elements of these conditions also relate to the following section, which examines barriers to successful technology integration. This section does not exhaust the content of the editorials, but presents the journal information in different contexts for the different issues. The essential conditions, as a published and copyrighted resource produced by ISTE, are not specifically mentioned in the journal editorials until 2004 and 2010. The 2004 journal issue highlights a specific school district in Texas that had made considerable gains in state assessments; these gains were attributed to the full and robust integration of the essential conditions and NETS. The 2010 journal focused on the importance of communication and collaboration between teachers and administrators in developing a shared vision for integrating the NETS; the journal highlighted specific successful one-to-one laptop initiatives. Before the 2004 and 2010 references, journal editorials identify the need for schools or districts to make a long-term investment and commitment to integrating technology into instruction. In 1983, there was a call for more research into effective applications and strategies for implementing instructional technology and for more federal and state funding to support the development of new curriculum and leadership development in the field.

The most consistent characteristic for success in technology integration represented in the journals relates to teachers. The 1988 editorial, for example, noted that technology must be made easily and readily available and that it must be easy to learn and to use. The editorial also states that teachers must have access to computers at home and at school; they must have opportunities for one-to-one peer instruction and opportunities to observe master teachers using technology in their instruction. However, in addition to these solutions, the article notes that education would be better overall if the following were also true:

- Teachers had more social status
- Society valued education more
- Teachers were more professional
- Teachers were lifelong learners
- More and better in-service opportunities were made available
- Teachers had more time to prepare
- Teachers made more of an effort

A 1990 article noted that teachers should take more professional responsibility and learn to integrate technology into the curriculum because, as a result of the slow nature of the education system overall to adopt formal strategies for coping with the speed of change, teachers cannot wait for support to come to them. Teachers were called to empower their students by helping them learn to use computers effectively as tools for learning and solving problems and to take a leadership role in facilitating change. In addition to teacher responsibility, the last issue reviewed from 2011, discussed that successful NETS integration relied upon effective and innovative leadership and management, noting that digital-age success requires administrators to embrace modern resources and training. It was noted that administrators are willing to collaborate and communicate with teachers about the use of Open Source and Web 2.0 resources in exploring project-based learning and higher-order thinking skills, online and blended learning opportunities, and one-to-one programs.

Transitioning from the traditional learning space to one that aligns with ISTE's essential conditions and the requirements laid out by proponents for twenty-first-century learning is a complicated endeavor that requires change on multiple levels and for many stakeholders. Beginning with the first journal editorial in 1974, ISTE has examined various barriers to what it considers the appropriate and successful integration of technology into education. Perhaps not surprisingly, these challenges and barriers remain.

BARRIERS TO TECHNOLOGY INTEGRATION IN EDUCATION

The first color personal computer, the Apple II, was available by 1977; by the early 1980s, personal computers had become relatively inexpensive for the consumer market and began to make their ways into homes and schools. Even before personal computers were widely available, the *Oregon Computer Teacher's* 1974 journal editorial identified the following as the main barriers to technology integration, many of which reflect the same barriers preventing instructional technology integration in schools today:

- Cost
- Lack of agreed-upon goals for instructional computing at various grade levels
- Low levels of computer literacy among both teachers and administrators
- Lack of leadership
- Few good-quality instructional materials
- Lack of trained teachers

Each of these barriers is presented in the recent journals—except for the lack of agreed-upon goals for instructional computing; this barrier was largely overcome with the creation of the NETS. Many school districts find themselves in the same position they were in, in the 1970s: trying to secure funding, to keep pace with change, to provide adequate training opportunities for teachers, and to develop long-term strategies. Barriers identified in the journals reflect a lack of coordinated advocacy, a lack of federal and state support in terms of funding, and a lack of leadership surrounding infrastructure, curriculum development, and teacher training.[102] Additional barriers noted across time are an overall lack of teacher training, the computer illiteracy of teachers, and the speed of change with which technology evolves, including changes and continual "improvements" in hardware, software, and network speed.[103] The theme of teachers lacking skill, lacking access to professional development, lacking time, or lacking support is the barrier most frequently noted. This finding coincides with the literature that most often discusses lack of technology integration in terms of teacher ability, interest, or support.

[102] For summarized examples, see chart in Appendix II for the years 1978, 1980, 1981, 1983, 1986, 1994, 1996.

[103] For summarized examples, see chart in Appendix II for the years 1978, 1981, 1982, 1983, 1994, 1996, 1998, 2001, 2002, 2006, 2011.

The final two barriers identified[104] in the journals relate to lack of broad stakeholder involvement in developing an overall vision and plan for integrating technology and making substantial education reform (most especially involving collaboration among teachers and administrators) and the difficulty in fostering overall cultural change in the education system. The journals note that, without the agreement of administrators, teachers, and support staff about these structural changes and the expectations related to instructional and curriculum adjustment, the vision cannot be realized. This perspective recognizes that for the culture of education or the instructional cultures of educational institutions to change, there must be broad agreement and participation in determining what that change looks like. For technology integration, this means that administrators, teachers, parents, and students must all be on the same page with what technology is important to have access to and how it should be used for instruction and student learning.

The 1998 and 1999 editorials introduce the idea that technology integration requires cultural change in the education system specifically to succeed. For example, the editor of the journal compares the state of technology in education specifically to Everett Rogers' *Diffusion of Innovation* research (1995), noting that although there might be good examples of improved technologies and improved educational outcomes as a result of using technology for instruction, broad-based change is not happening because the industrial-age culture of the education system is deeply engrained and difficult to change.

[104] For summarized examples, see chart in Appendix II for the years 1986, 1987, 1994, 1996, 1998, 2001, 2010, and 2011.

The following complexities are also noted regarding the difficulty in changing the educational culture overall:

- Involves a number of stakeholders that have different interests
- Is inherently political as a public institution caught within an ever-evolving series of political parties' interests
- Requires consensus on vision and funding (which diverts attention and funds from existing projects in which stakeholders have interest)
- Requires a shift in curriculum design and instructional and assessment strategies
- Requires continual investment in and maintenance of infrastructure (hardware, software, networking)
- Goes against long-held beliefs about what it means to be a teacher and a student

In short, change is not attractive to the stakeholders in the current system because these cultural/structural shifts make many aspects of the education system irrelevant. This threatens the leadership structure and operational infrastructure: change goes against their best interests. As these barriers demonstrate, there is no single reason for lack of effective instructional technology integration. Instead, there are a variety of reasons and combinations of reasons that vary according to institutional policy, individual leaders and teachers, funding or lack thereof, access to infrastructure, lack of support for existing technology, lack of interest, lack of time, and lack of purposeful planning.

Although each of these types of barriers to effective technology integration is raised in the journals, the one most frequently and consistently noted relates to teachers as the source of the problem because they do not have time, access, skill, or administrative and professional development support. Teachers are identified as being at the heart of the solution for improving teaching and learning with technology and ultimately for changing the way we consider what constitutes a quality education that meets the needs of the information age. Understanding how barriers and solutions to instructional technology integration are framed by ISTE and other stakeholders provides insight into the production of the instructional technology culture and the expectations that have been broadly established for using technology as part of the important educational reforms being sought. My research conducted in the ISTE member journals shows that the framing around benefits and barriers to effective integration of technology in schools has largely stayed consistent since the early 1970s. Why, in 2012, do these barriers persist, and why haven't greater strides been made? Having common standards for instructional technology in place provides a common ground for expectations in how to use technology in the classroom effectively; identifying the essential elements for achieving success is important for administrators and teachers to benchmark and plan for change. The production of instructional technology culture has laid the groundwork for popular expectations for instructional technology uses in the classroom as well as its barriers. This research suggests that the production of this popular narrative has neglected or diluted the key issues facing progress in instructional technology integration: bridging the digital divide and addressing the core needs of the average non-computer-using classroom teacher.

DISCUSSION

Since the 1970s, technology for education has evolved in interesting ways. In the beginning, educators were excited about using calculators to improve instruction for mathematics, or word processors for writing. Today, technology is changing the way education is being conceived of altogether. Traditional factory-like classroom instruction is being challenged by personalized online courses that use data analytics to tailor the educational experience to the individual. Technology has evolved, and societal dependence on ICTs for communication, business, political and social engagement, health, and entertainment continues to grow. Although most sectors of society have fully integrated technology to enhance communications and business efficiencies, the adoption of ICTs in education has been slow. Despite the inability to fully integrate technology into classroom instruction, education stakeholders from private and non-profit businesses, government, and education all proclaim the importance of ICTs to education. The narrative surrounding technology in education is mostly that of broad acceptance, inevitability, and ubiquitous access. How has technology gained such prominence in education and yet achieved such a slow rate of integration? Why, despite concerted efforts over the past 30 years, are computer-using educators and leaders still having to convince teachers and students of the value of ICTs to instruction? Why do teachers and administrators who want to integrate technology in the classroom face most of the same barriers to technology integration that were present at the emergence of instructional technology? How can there be broadly accepted standards or expectations for ICT use in education when such disparity in the quality of instructional technology usage remains in the United States and internationally?

This section explores these issues through critical discussion of the presented research data to address the research questions driving this study. The first broad research question is, “What factors contribute to the creation of expectations, via standards, of technology in education? The intermediary research questions used to examine this broader question are:

1. How has the International Society for Technology in Education (ISTE) established technology standards for education?
   a. What process has ISTE followed to establish technology standards?
   b. What has impacted change in standards since the initial standards were established?
   c. Which industry, government, and individual actors have contributed to the establishment of ISTE technology standards and in what ways?

2. In what ways have technology standards and expectations of technology in education been facilitated by ISTE internationally?

The second key broad research question of this study is, “In what ways has institutional discourse of ICTs in formal education changed over time?” This question is investigated with the intermediary question: “How has ISTE’s discourse, related to ICTs in education, been framed since its founding in 1979?”

The value of using technology for educational enhancement has been well-established by ISTE since the inception of the organization. Education and technology conferences today highlight sessions on innovations and technology that can address modern-day challenges as though this were a new solution. However, the ISTE member journals and archival materials show that computer-using educators have long known the benefit of and need for technology to reform schools and to help teachers make learning more immediate, more relevant, more engaging, and more student-directed. Researchers, politicians, and businesses have all established the need to incorporate technology into the education system to meet the economic, social, and political challenges presented by the growing and globally competitive economy—an economy and political reality that is changing what our students need to know and do to function effectively as citizens and to contribute to the increasingly fluid labor force. Additionally, as children grow up using technology and have expectations of their own related to access, speed, and reliability, demands for more and better technologies in the classroom continue to grow. Aligned with the student and parental expectation is the exploration of how technology actually changes the way learners' brains process information and what implications this might have for the growing disconnect between student educational expectations and needs and the currently outmoded form of the industrial-age model of education. In the United States and internationally, education associations, parents, governments, and businesses are all calling for broad reform of the education system. These stakeholders want an education system that better addresses the needs and interests of today's learners, the labor force demands, and national security. International development agencies, likewise, are trying to raise the level of access to education and increased life chances to participate in the global economy and improve the quality of life by using technology in education.

ICTs are at the heart of national and international education reform. With the right level of Internet connectivity and hardware infrastructure, ICTs facilitate greater access to information, communication, collaboration, and overall efficiency for organizing, storing, and sharing information. Having access to and being able to effectively use technology is critical to success and participation in the international workforce, the economy, and society. To address the needs of the workplace and students' interest, to harness the benefits of technology to employ greater efficiencies and access to information, and to improve teaching and learning overall, ISTE and their stakeholders developed a set of common benchmarks, the NETS, to ensure quality integration of ICTs in education.

The value of having a set of standards that educators and administrators can follow to make change in education is important on a number of fronts. From a business point of view, having standards makes it easier to develop ICT products that meet the standards and open new selling opportunities to assist schools trying to meet these expectations. For administrators, having standards provides justification for applying for funding through private and public means. For government, generating revenue and supporting livelihoods through ICT industries and educating students to be more competitive and ready for work in a global economy are key drivers for their support of education standards. For teachers, the value of having technology standards for improving instruction and creating more individualized and engaging learning opportunities for students motivates teachers to engage with technology in the classroom. However, despite the widespread story that technology and education are not only required, but also ubiquitous in access and use is not only inaccurate, it is a detriment to underserved teachers and students in low-income schools across the United States. The standards cannot be met when such divides in access to ICTs persist.

The process used to develop the technology standards reflects an engagement of individuals, businesses, and nonprofit educational organization stakeholders who interact within a culture of production that sets expectation for how and why using technology is important. ISTE engaged a variety of stakeholders in a fastidious process driven by computer-using educators. As a nonprofit organization driven by organizational mission and vision, ISTE applied for initial governmental funds to develop the NETS standards based on a grassroots philosophy of being operated by and serving educators and working towards bridging the digital divide. However, the benefit of producing this instructional technology culture has been largely limited to the stakeholders involved in creating the culture and to the computer-using educator membership that ISTE serves directly. This is not to say that the process was not legitimate or that the outcomes of developing the standards were not beneficial to schools and individual classrooms. What is reflective in the data, and in the development communication literature, is stakeholders have benefited most from the development effort. Those who the development project is purported to serve—in this case, teachers and students in poor and wealthy schools—see little to no change. The production of instructional technology culture, through the development and promotion of standards, is self-perpetuated by the various stakeholders themselves. For example, the first set of standards was funded mostly through the federal government and was sought at a time when bridging the digital divide was a key interest of government, technology companies, and educator stakeholders–the intent was to get ICTs in the schools. This digital divide theme was central to the production of instructional technology culture and the development of the standards. At the time when the NETS were refreshed or revised, the narratives cycled among the stakeholders involved in producing the instructional technology culture were focused on preparing students and teachers for success in the twenty-first century. This effort has been largely led by private-sector coalitions and supported by government and other education associations. ISTE sought private funding to revise the NETS, based on the need to prepare students and teachers to compete in the twenty-first-century competitive market place, and to update language to align more with changes in technology. The changes made in the standards revision opened up international opportunities for ISTE.

The NETS Refresh was accomplished through private funding and by broadening stakeholder involvement to include international partners. One of the main goals of the NETS Refresh project was to create international benchmarks. This move allowed ISTE and its partners to spread and promote instructional technology standards internationally. These international benchmarks for technology in education allowed ISTE to expand business opportunities by extending professional development training, support materials, and consulting services in the United States and internationally. Additionally, business partners were able to expand and tailor their products to address and promote the standards to a larger marketplace. Both ISTE and the private funders of the NETS Refresh project were placed on the UNESCO board to help develop international instructional technology standards. The revised standards were intended to serve and benefit teachers and students and to encourage progressive changes in education. The writing of the revised standards was a rigorous process that involved a number of education stakeholders from the United States and internationally; the standards were crafted in such a way that they could serve as a starting point for other education ministries outside the United States to customize. The framing of the narrative and the expectations surrounding how and why technology should be integrated into education came from educators who recognize the value of technology to teaching and learning.

These expectations fit within the framework already established by the producers of instructional technology culture–the stakeholders involved in the process.

The data from the editorials of the teacher-member magazines from 1979 to 2011 show a progressive narrative for how and why technology should be used to transform education. In addition to the benefits, the challenges and barriers that prevent widespread integration of technology also remain the same throughout the years. What did change in the discourse of the editorials between 1979 and 2011 was the exploratory, sometimes critical, sometimes futuristic examination of technology in education and the issues surrounding it. The most prominent change in the discourse occurred between 2001 and 2002 when, instead of exploring issues related to technology, the magazine editorial became a highlight or review of each issue's contents. Two key events happened during this time: the ISTE produced the first set of NETS standards, and the long-standing founder of ISTE, who wrote the editorials from the start, retired. During this time, the ISTE organization went through a lot of changes in organizational leadership and structure. An advocacy office was established in Washington, D.C., and concentrated efforts were made to use ISTE's membership network to influence policy and support of technology in education. In this transition, the editorials became more generalized and geared toward grouping the content of each journal under a common theme. In 2007, the NETS revision for student standards was released; from this point to 2011, the focus of the editorials and the overall content is on highlighting various aspects of different standards. The narrative of the ubiquity of technology and the stories of schools and districts that successfully implemented the NETS became more prominent.

The ISTE organization began to focus more of their expertise, training, and publication resources on promoting the NETS standards and using their expertise to shape the instructional technology culture narrative. This subtle shift is perhaps not a deliberate decision, nor, from an editorial and organizational point of view, is it negative. In fact, because of the increased focus and narrative surrounding standardization and the growing international standardization movement in technology in education, ISTE did as their membership and other stakeholders would have expected–they promoted and recycled the narrative being shared and produced and prioritized. Like DuGay's (1997a) research on the Sony Walkman, and like the findings of development communication research, the culture of production and the stakeholders that work and live within this cultural environment interact to shape the narrative that determines what, how, when, and why technology is or should be prioritized and integrated into teaching and learning. In addition, the challenges and benefits surrounding technology usage are shaped by these same stakeholders. This research is limited by the total number of journals analyzed and by the fact that ISTE is only one of the many key stakeholders involved in the production of instructional technology culture. However, it is important to note that while the benefits and overall demands for ICTs in education have been well established, inequity continues among schools in terms of instructional technology integration, access, and the ever-evolving digital divide–in all the shapes the divide is realized.

Homes and schools located in poor communities continue to face barriers to Internet connectivity and use of technology for educational and economic advancement. Minority students continue to underperform in low-income community schools. When student performance falls short on standardized tests, teachers are to blame. When technology is not integrated into the classrooms effectively, teachers are to blame. Teachers and students are facing incredible challenges related to the deep-seated socioeconomic inequities that exist throughout the education system, but these key foundational issues are not present in the cultural production of the instructional technology narrative. Instead, the focus is on the standards–what *should be*, not what *is*. Having established instructional standards and identifying the essential conditions to foster their growth is an important component to reaching progressive and important goals in education. However, the focused narrative clouds what is at the root of what ails success in true education reform.

As one of many stakeholders involved in the production of instructional technology culture, ISTE frames the discussion surrounding technology in schools as a standards issue. The narrative communicates that technology, and ubiquitous access to it is inevitable and the standards are the anchor which establishes technology as critical for educational and professional success. Stakeholders communicate this point of view in various ways: in how they create funding parameters for grants, in how professional and social working environments reinforce common expectations, in how businesses operate, and in how districts, schools, and classroom teachers are judged. The culture of production then cycles and recycles this narrative in the name of bridging the digital divide or in improving education in the United States and internationally, but the plight of poor schools and communities—and especially teachers facing serious social and economic challenges in the classroom—continues.

Chapter Five: Conclusion

Researchers examining the digital divide have explored economic, infrastructural, cultural, and social differences that contribute to lack of instructional technology integration among low-income, rural, and minority communities, placing them at a great disadvantage academically and economically.

The culture of production for the expectation of ICTs in education, produced by ISTE and other stakeholders, frames the narrative around ICTs on the inevitability, the need, and the benefits of ICTs in education. Popular discourse, research reports, and stakeholders have all set off the alarm that schools are falling behind other sectors of society in integrating ICTs in instruction and that making equitable access is a national and international concern. However, specific goals for how to bridge these gaps are not present, and the ongoing challenges caused by the inequities present in schools are not being addressed. Of the 58 editorials of the ISTE member journals reviewed, three noted barriers of instructional technology within the framework of the digital divide:

- The digital divide could be addressed if schools and teachers would integrate technology across the curriculum[105]
- Ubiquitous computing is inevitable for students; the digital divide is no longer about having access but is now related to the learning divide, and teachers must now empower learners to use technology effectively and appropriately[106]
- Equitable access to technology is a problem and it is up to teachers to survey student access and come up with innovative solutions for helping students gain access to technology[107]

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[105] ISTE member journal editorial from February 2001.
[106] ISTE member journal editorial from May 2002.
[107] ISTE member journal editorial from April 2006.

These three editorials reflect broader popular discourse surrounding the digital divide: a focus on standards, the idea that ICT accessibility and use is now ubiquitous, and the expectation that teachers are responsible for surmounting challenges in the classroom. This framework focuses the narrative of ICTs in education as inevitable, positive, and accessible; it centers the justification for these perspectives on the existence of standards. Because standards exist and computing is ubiquitous, who else is to blame for lack of integration but teachers? The journals recognize the positive uses of technology for education noting that technology is ubiquitous and inevitable and that teachers are the key to achieving instructional technology integration success in the classroom. The cultural narrative produced for public consumption in the ISTE member journals demonstrates inevitability, benefit, and strategies for helping teachers achieve successful integration in their classrooms. However, in the culture of production, the narrative of the digital divide is central to justifying ICT initiatives. The digital divide was central to the proposals that ISTE submitted to garner financial support for development of the NETS standards.

To create equity in schools and common expectations in quality and access for all students, standards were used to set a benchmark of expectations for all schools teachers, students, and administrators. The narrative produced by the stakeholders in the funding process is that the ICT initiatives are justified in providing equitable access and improving the life chances of all students to participate in the twenty-first-century economy. This internally circulated narrative of using the digital divide as justification for ICT in education is present in the archival documents related to ISTE's strategic planning efforts, in the reasoning for seeking funding for NETS development, and in ISTE's advocacy efforts to garner continued political and financial support among membership for ICTs in education.

There is a disconnect between the production of instructional technology culture and the reality facing administrators and teachers in the classroom of poor schools: prioritizing technology in education, with its ever-evolving and improved types of technologies and Internet connectivity, will *maintain* the digital divide. Unless specific advocacy measures are established to develop equity among all schools with a required minimum of ICT infrastructure and ongoing technical support, poor schools will continue to be at a disadvantage. Effective integration, use, and continual tech support of ICTs for all schools is not ubiquitous, nor is it inevitable. For more than 30 years, large-scale progressive change in education has not been realized through the use of ICTs, and inequity among schools continues to grow. Inequity across the school system contributes to, and reinforces, the digital divide, and the divide hinders teacher and student success in the classroom.

If individuals in the United States or internationally have access to funding and high-quality education, speak English, and are literate, they are more likely to have access to high-speed networks and computers and are more likely to produce, share, and acquire information (Murelli, 2002; Pippa, 2001; Bolt & Crawford, 2000). An op-ed in the *New York Times* (Crawford, 2011) titled "The New Digital Divide" raises contemporary concerns related to the over-dependency on high-speed networks for citizens who access shopping, entertainment, education, healthcare, and political engagement online. The article notes that "…we still talk about 'the' Internet, we increasingly have two separate access marketplaces: high-speed wired and second-class wireless. High-speed access is a superhighway for those who can afford it, while racial minorities and poorer and rural Americans must make do with a bike path." To further describe the face of digital inequity, DiMaggio and Hargittai (2001) developed five variables to describe the digital divide:

> …technical means (inequality of bandwidth); autonomy (whether users log on from home or at work, monitored or unmonitored, during limited times or at will); skill (knowledge of how to search for or download information); social support (access to advice from more experienced users); and purpose (whether they use the Internet for increase of economic productivity, improvement of social capital, or consumption and entertainment) (Warschauer, 2003).

Much research, debate, policy, and national, state, and local efforts have been put in place to address the digital divide since the late 1990s (Straubhaar et. al, 2012; Fuentes-Bautista, 2007). As a result, there have been many successes in the United States and internationally in creating public access to technology. However, in schools, where many might assume that we would now see not only high-speed connections and computers for every teacher and student, along with adept use of technology for instruction and self-directed student learning, this is not the case. In many first-hand accounts in schools throughout the state of Texas, I have witnessed districts that still struggle to establish or maintain a simple network for their campuses. Even more often, I have worked with technology coordinators who are responsible for helping teachers learn the value of using technology in education and who struggle to find interest let alone participation among teachers. I have participated in training sessions where teachers did not know how to use email; when asked to access Internet sites, teachers became confused about where to type URL addresses. We have a long way to go in reaching ICT ubiquity in education and the standardization movement is preceding accessibility.

The critical research of development communication and digital divide theories helps to provide some insight into why this disconnect might be present. For example, when examining ICTs in development efforts internationally, it has been found (Mody, 2000; Downing, 1999; Main, 2001) that the stakeholders and leadership of these initiatives benefit most from the ICT development projects, through the circulation of funding and the continued justification for the relevancy or existence of the organization intended to see these development efforts realized. The benefits of such development efforts most often serve to support and benefit those that produce the ICT initiatives; the end users' lives and situations go largely unchanged, and the digital divide remains. Similar disconnects between well-intended federal and private infrastructure programs (Warschauer, 2003) face similar issues where funding to support greater digital equity circulate among the program developers, telcos, and stakeholders but the end result is not equitable distribution or use of technology in low-income, rural, and minority communities. Identifying barriers and solutions to facilitate greater ICT equity is a challenge not only for the United States (Hoffman & Novak, 1998; Hoffman, Novak & Schlosser, 2001; Kaiser, 1999; Strover & Straubhaar, 2000a, 2000b; Wilhelm, 1998; Fuentes-Bautista, 2007; Straubhaar et. al, 2012), but globally (Webster, 2003; Mody, 1999; Luyt, 2004; Selwyn , 2002). In fact, with globalization processes increasing

(Castells, 1998) and international education narratives aligning as a result, it makes it more difficult to pinpoint the specific sources of power (Wilkins, 2000) or intent behind ICT development initiatives in education. This makes finding solutions even more complicated. This is why it is critical that narratives and processes surrounding the cultural production (Du Gay, 1997b) of ICTs are deconstructed with case study samples like this one. Through this type of analysis a deeper understanding for how and why the production of educational technology culture is constructed and how stakeholders in this culture of production contribute to and guide the development of this narrative. It is through this deconstruction that the focus can be redirected on the ultimate goal of the development project to integrate ICTs in education; to provide equitable and meaningful access to all in and to raise the standard of living for the individuals in most need. Focusing on the national and global process to create and implement ICT standards, for example, while perhaps an important component to education, ultimately serves to distract stakeholders from the key infrastructural inequities that persist and widen socio-economic divides within among nations. There is an irony present in the narrative that reflects ICT ubiquity and inevitability in education alongside the continued divide that exists between the ubiquity rhetoric and the realities facing the classroom teachers and students facing physical, social, ethnic, cultural, and economic barriers to accessibility and effective usage of ICTs. National and international ICT infrastructure in general and in education specifically, is reflective of broader national and global economic inequities. Continued lack of ICT integration in education will ultimately serve to reinforce and extend these inequities. The challenge is to recognize the disconnect between intent and reality in bridging the digital divide.

Many factors contribute to the disconnect between the stated intent of bridging the digital divide and the efficacy in making change in the local communities that these programs intend to serve. For ISTE, this disconnect presents itself with regards to organizational mission and vision, membership, identity, and the initiatives and narratives that are produced as part of the instructional technology culture. The overall mission and vision of ISTE has always been to improve education through the effective use of technology. ISTE strives to achieve this vision through a variety of means. ISTE supports their computer-using member educators and those interested in integrating ICTs in education with conferences, publications, training, and effective techniques for helping teachers and administrators integrate technology into classroom instruction. In addition, ISTE has invested major organizational effort and focus on developing the NETS standards to help create an accepted standard in expectations for what students, teachers, and administrators should be able to do with technology in education. ISTE has also created an advocacy network among its membership and the membership of its organizational affiliates to help influence federal funding and support of ICTs in education. Much of ISTE's practice surrounding publications, advocacy, and member support services since the NETS were established focus on promoting the NETS standards nationally and internationally. The organizational focus on developing and promoting the NETS standards allowed ISTE to establish expectations and goals for ICT integration—an important step in bridging the digital divide in schools. Having a minimum set of standards to strive for creates a common benchmark of expectations to fulfill. However, this focus on standards detracts the instructional technology narrative from more challenging conversations concerning inequities among schools and the deep socioeconomic divisions that continue to reinforce the digital divide and the overall inability to distribute equitable opportunity for students.

Board and staff meeting minutes reflect the ongoing challenge among ISTE's staff and board members to establish organizational identity and roles. For many nonprofit organizations, the challenge is to fulfill organizational mission and vision while maintaining economic solvency. To achieve this goal, nonprofits often must seek funding from several different types of sources, each with its own set of values and expectations; these fundraising efforts can stretch a small staff very thin and directs the organization's energy to where funding can be generated. In this case, the research archives show that ISTE tried to find a balance between serving their membership with resources and services and also contributing to overall educational improvement nationally and internationally with the intent to use technology to improve instruction of teachers and learning opportunities for students. ISTE's internal culture of production is developed within the framework of being a grassroots, teacher-member organization that relies on diffusion of innovative practices of instructional technology. By providing resources and services to computer-using teachers, and by networking through other stakeholder organizations that have similar missions, the intent is to spread the expectations via standards and best practices through training and resources. The Initial ISTE proposals seeking federal funding to support the development of the NETS identified the diffusion model as the method for disseminating the NETS and judging the success of the project. This diffusion success depended on the stakeholder network and the dissemination of materials to stakeholder leaders and the membership base. However, in the member journal editorial from October 1998, the complexities surrounding the diffusion model and the greater challenge of cultural change was identified as a reason for why broad-based reform in instructional technology is so difficult to achieve. This disconnect between funding objectives and stakeholder expectations, the internal cultural production of narrative that identifies internal identity, goes counter to the complexities of actually finding and integrating solutions to complex cultural, social, and economic issues. In such cases, the organization becomes more concerned with the stakeholder objectives out of necessity for funding support, and the culture of production becomes narrowed to support and recycle narratives of the stakeholders that work to sustain and justify the efforts and identities of the stakeholders. In ISTE's case, the focus on the NETS standards fits within the broader narratives of other education stakeholders striving to incorporate the standards in other areas to improve accountability and educational success. Where ISTE's internal culture of production is framed within a grassroots teacher-member narrative, in practice, the focus is a national and international effort to create broad-based standardization of ICT expectations. Although having the standards is an important piece, focusing the majority of the organizational resources and energy on the standards does not leave room to address the key barriers that prevent equitable integration and success of ICTs in schools. For ISTE, this is a missed opportunity to explore innovative solutions to overcome barriers faced by teachers.

With standardization projects, as reflected in the New York City school system's decision to publicly release individual teacher performance rankings, teachers are faced with great public pressure and scrutiny for realizing student success. Every parent wants to know that his or her children are receiving a high and equal level of quality instruction. Every administrator needs a way to evaluate classroom success. Standardized testing and standardized benchmarks provide a way to do this type of evaluation. However, teachers face a challenge that other professionals in the workplace do not. The children they serve come from a variety of backgrounds; in poor communities, students often come to school hungry, without a foundation of reading or a general expectation for why school is important. Additionally, many teachers in poor communities are not provided with a level of technical support that other professionals expect to do their jobs adequately. In the case of ICTs, this often means restricted or limited access to computers and broadband Internet connectivity for teachers and students at home and at school. Even if a school receives hardware or Internet service through grant funding or government-supported programs, it is difficult for campuses and school districts to maintain the network to keep computers and connectivity at a high level of reliable functionality. The schools cannot afford to hire the number of staff necessary to support all the teachers' and students' computers across the campuses nor can schools afford to replace outdated equipment in an ongoing fashion as new and better hardware and online services surface. All schools face monetary challenges, but teachers in low-income schools face additional deep-seated socioeconomic challenges that make incorporating technology into the classroom difficult. The irony is that these teachers and their students have the most to gain through education reform and full integration of ICTs for instruction and learning. To achieve the goal of improving education through effective integration of technology, organizations like ISTE have to move beyond the standards to find new solutions. To enforce the mission and vision of ISTE's grassroots teacher-member identity, the narrative and instructional technology culture must embrace a more complex narrative that address school inequities before it can realize broad-based reform and improvements in education. The NETS and identifying the essential conditions for realizing them is a good first step, but to help teachers and administrators overcome the barriers that have been known for decades, new solutions must be tested. As the development communication literature shows, ICT initiatives internationally often benefit stakeholder leaders and not the end users. The lack of program efficacy in achieving desired outcomes with the end users—in this case, successful instruction and learning outcomes through the use of ICTs—is a result of how the internal culture of production works: to focus on the narratives that get recycled among those teachers and stakeholder leaders that already understand the value of ICTs in education.

The empowerment approach to development communication aims, through participation, to create leadership and ownership of change amongst the beneficiaries of development projects by integrating the beneficiaries themselves into the process of identifying problems, benefits, and solutions for how the project can improve their situation (Ascroft & Masilela, 1989). Nonprofit organizations are in a unique position to work with beneficiaries in this way because of their situation between the market and governmental expectations. The intent of the nonprofit organization is to serve needs not met by private enterprise or government initiatives. The challenge is for these organizations to serve this space without becoming bound to private or government interests where funding often comes with stipulations and expectations that align with such stakeholder groups.

ISTE serves those teacher members who are already believers in the benefit of instructional technology; but to realize broad-based reform, ISTE must reach out to those teachers who do not share the vision. There are two key things that ISTE could do to help facilitate broad education reform through the effective use of ICTs. The first is to rethink the grassroots identity and broaden the scope of what that looks like; and the second is to include and embrace teacher members who may or may not see the value of ICTs to education and to include them in narrative production. If the intent is to improve education, the narrative surrounding ISTE's instructional technology culture must reach beyond the stakeholder group's expectations and the NETS and include teacher membership beyond those who already value it. If the narrative broadened to include equity in access and use of ICTs to improve education, teacher membership and the value that ISTE brings in this space could be more encompassing. ISTE has sent a progressive message and rationale for why ICTs can improve education since the 1970s and was perhaps before its time in identifying the need for twenty-first-century skills, when other organizations only recently see this as a phenomenon. The problem is that this narrative is only being circulated among the stakeholders who already believe in the message. The production of the instructional technology culture is benefiting the stakeholders of ISTE related to the resources and services it provides to members and the ICT standards being promoted nationally and internationally. This does not, however, work to serve the broad base of teachers who are facing seemingly insurmountable challenges in their classrooms. To succeed, ICTs must directly support teachers' needs and help them overcome these challenges. Additionally, teachers and students must be supported to do their jobs well through the integration of high-quality and ubiquitous computing, which does not yet exist. The narrative must be adjusted to account for the fact that technology should be ubiquitous but it is not. This space would open the dialogue to include teachers outside of ISTE's typical membership base and facilitate sharing and collaboration for finding solutions to these difficult barriers.

Taking all these required cultural and infrastructural systemic changes into consideration, acknowledging that teachers receive low pay and low respect and experience high turnover rates, and given the severe bureaucracy and funding restraints of this large national institution of education, the lack of change in the educational system is really not surprising. The 1986 journal predicted that, ten years from that writing, the same editorial could be republished because the same issues will continue to present themselves over time. Why then, given the current state of technology use in education (which has not made significant strides overall in improving instruction or educational outcomes), hasn't the culture that ISTE and other stakeholders have produced reached the classroom teachers that reside outside the circuit of production? If government and business leaders believe that education is in a state of crisis, and if stakeholders—including ISTE—have known the benefits of technology and what is required to facilitate successful integration, what can the data surrounding the development of the NETS, the international distribution of the NETS, and the internal production of the culture of education technology reveal?

I argue that there are two key points that have contributed to this impasse in education for which the ISTE case study provides insight. First, the circuit of production responsible for creating an education technology culture accepted by stakeholders works to establish expectations for the use, value, and purpose of technology by teachers and students. The axis around which this production revolves is not the end users, but the stakeholders. This has national and international implications. Second, the problem of the digital divide is far from being solved. Providing equal and robust access to technology continues to be a key issue that those involved in the circuit of production for education technology culture must address if we are to realize widespread progressive change in education through the application of ICTs. These issues must be addressed before teachers, especially in low-income schools, will be likely, willing, or able to experiment with, let alone incorporate, technology meaningfully into their instruction.

Stakeholder collaboration is what is needed to accomplish this daunting task. Each stakeholder has different motives for participating in this narrative; each benefits and contributes to bridging the digital and socioeconomic divides among schools by engaging in the movement and applying their strengths. Government stakeholders need to establish a minimum requirement of ICT infrastructure and ongoing technical support for all schools. If education is to benefit from ICTs as other sectors of society have done, it must be prioritized and funded. Business stakeholders must focus their efforts on creating innovative ICT applications that address the needs of classroom teachers, help find solutions to the classroom challenges identified by teachers, and use their influence to advocate for broad government ICT infrastructural support. Encouraging ongoing stakeholder involvement in the production of instructional technology culture is critical to working toward equity in schools and bridging the ongoing digital divide. However, the narrative and goals of these decision makers must be expanded beyond simply the standards, benefits, and expectations of ICT usage in the classroom, to include critical examination and creative solutions to challenges that dissuade or disable teachers from being successful.

Nonprofit organizations, like ISTE, play a key role in addressing important issues that cannot or will not be met by the government and business interests. As ISTE has done, nonprofits can facilitate communication as neutral entities whose responsibility is to serve their members and, more broadly, classroom teachers, and to improve instruction with the effective use of ICTs in instruction. The standards were an important step in establishing a common language and expectation about what good use of ICTs in the classroom looks like. Now, the narrative of instructional technology culture needs to move beyond the standards and focus on what is preventing teachers, especially those who do not or cannot support the use of ICTs for instruction in their classrooms. As nonprofit organizations, ISTE and others can use existing social and member networks through creative use of technology. Instead of serving a small number of paid members, for example, nonprofits can extend open membership to all classroom teachers—to reach a broader audience of non-computer-using teachers—and to use social networks to explore new models for making widespread change among educators themselves.

Computer-using educators can influence non-computer-using educators by sharing best practices and helping teachers who face seemingly insurmountable classroom challenges find ways to use technology for classroom solutions. Possible solutions for initiating broader buy-in could include creating robust grassroots networks among all types of educators, engaging believers and non-believers in the instructional application of ICTs, and engaging teachers to find their own solutions to their classroom challenges. In addition to making broader change, organizations like ISTE can increase their advocacy power base to encourage government and businesses to support ongoing funding and infrastructure for schools, based on the demands of the classroom teacher. It's important that the decisions be driven from the bottom up, not from the top down because top-down decisions are not likely to be implemented. This can be challenging because ISTE, like many nonprofit organizations, is constrained by the conflicting elements of its internal culture of production: it is caught between both the restraints and benefits of its mission (its grassroots, nonprofit, membership-based identity) and the business focus on growth and generating revenue. For ISTE, focusing on the standards has helped anchor their international identity and extend their business opportunities beyond the revenue generated through their annual conferences and publications. However, as my research demonstrates, classroom teacher support and progressive educational change is at the heart of what drives ISTE staff and volunteers; they recognize that teachers are the key to facilitating broad scale change in the education system. The barriers to preventing the classroom teacher from being successful in using ICTs effectively in the classroom have not been ISTE's focus in a concentrated organizational effort. ISTE's main focus has been to implement a diffusion model of reaching the average classroom teacher by supporting computer-using educators and by disseminating standards and support for effectively using ICTs. Finding ways to reach beyond computer-using teachers and to directly address the incredibly diverse set of challenges non-computer-using teachers face in the classroom poses a greater organizational challenge. Technology must address the challenges teachers face in the classroom and help them solve problems in an obvious way. If ICT use detracts from the goals and expectations being placed on teachers, and if ICTs are not easily and ubiquitously made available, technology will go unused and unvalued. Unless nonparticipating teachers become involved in adopting the culture produced by ISTE and related stakeholders, technology will remain absent from instruction.

Over the past 30 years, ISTE has made amazing strides in establishing a culture of expectations for how, when, and why technology should be used for teaching and learning; they have identified the essential elements required for schools and districts to implement a successful system. For participators in the circuit of production, these expectations—and all the derivative resources and services developed to support them—have benefited teachers who already see the value of using technology in education. Reaching and influencing teachers outside this circuit of production is much more difficult and is at the crux of making change in education. Although ISTE's mission and identity facilitated its role in the circuit of cultural production for technology's role in education, it has also limited their level of innovation to directly impact and address the much larger problem of meeting nonparticipating teachers where they are, in the classroom. It is this set of teachers who would most directly benefit from the practical, motivational, and supportive resources and services ISTE offers. Working with this larger group would also provide greater advocacy leverage. But because there is limited staff and limited funding available to nonprofits in general, and to ISTE specifically, organizations must make difficult choices. Part of ISTE’s mission has always been to substantially improve K-12 education through the effective use of technology. Although debate is present in board and staff minutes regarding ISTE’s ultimate customer, the focus has always been on membership and on collaborating with the leadership of other stakeholder organizations. Innovative solutions for reaching outside this circuit of production, to nonparticipating teachers, have been largely absent.

Another key detractor for realizing the broad impact of technology on educational improvement is the inability to overcome the digital divide through education. ISTE has established the essential conditions necessary for teachers and administrators to successfully integrate technology that directly impacts equitable access: consistent and adequate funding, skilled personnel, and technical support. Equity issues surrounding technology were discussed in the 1978 journal much as they are discussed today. What is interesting, however, is that ISTE’s member journals have recognized that the digital divide would be a moot issue if all schools provided equitable access. Education in the United States is supposed to provide a level playing field so that all citizens have equal opportunity for personal and professional success. Ironically, schools reflect the socioeconomic realities of the communities they serve. Their ability to address technology infrastructure and ongoing support is limited by a lack of skilled personnel and lack of funding, but also by the other challenges that prove more immediate. So although schools provide the ideal avenue to address the digital divide, they actually work to perpetuate it. As instructional technology standards were intended to create a common benchmark of expectations for ICT usage, the focus on the standards is detracting the narrative from addressing deep-seated inequities in education and ICT.

The rationale behind creating international standards to develop a common language and common benchmarks among educators and private companies who supply them with products is a logical move in terms of business strategy and education reform efforts. However, without policy that guarantees a minimum level of ICT infrastructure and ongoing technical support for every teacher's classroom, these standards will be impossible for teachers to live up to. Without monetary backing and government enforcement for these infrastructural support systems, and without taking into consideration the myriad social challenges that teachers face in the classroom, reform through the application of technology is simply something that allows stakeholders and businesses to grow and develop their agendas, no matter how well intended the efforts are. Teacher professional development is at the heart of the instructional technology standards movement; it has been widely recognized that teachers are at the heart of successful reform. Without incentives at the classroom level, and without the buy-in of teachers who do not yet see the value of ICTs in helping them solve day-to-day classroom problems, these initiatives will fall flat. The growing international focus on developing ICT standards will continue to detract from the production of instructional technology culture that addresses the inequities that exist within and among nations internationally. These inequities are outside the control of the classroom teacher whose goal is to provide high-quality instruction to students who must find meaningful work and social engagement in the modern world through the effective use of ICTs.

Because instructional technology culture is produced and maintained by deliberate decision-making, it is in our control to change the narrative and to focus our intent on facilitating international educational equity; we can even define an educational equity that goes beyond the standardization movement and focuses on grassroots advocacy that supports equity in ICT infrastructure and engages teachers in finding solutions and applications of ICTs to address ongoing socioeconomic challenges faced in the classroom. The focus has to shift toward addressing the challenges of the classroom teacher and researching innovative ICT practices that address the serious problems facing poor and marginalized students in low-income schools. International organizations, like ISTE, have an amazing opportunity and role to play at this critical juncture in educational change. By using ICTs creatively and expanding their advocacy networks, they can focus their efforts, expertise, and passion for educational uses of ICTs to make progressive change for teachers beyond their existing membership base, and beyond their current efforts and focus on ICTs standards.

To realize progressive action and greater equity in ICTs in schools, innovative solutions and partnerships must be sought. If ICTs are to be important in creating greater opportunity for working and living in today’s world, the stakeholders contributing to the instructional technology culture must involve teachers who do not know or recognize the value of ICTs for improving education. The value of ICTs might not be the same for each teacher, student, or community; until marginalized communities are engaged in the process of identifying and testing how these tools can best be used to solve their most challenging social, educational, and economic problems, equity in education cannot be realized. Without broad stakeholder engagement and greater political accountability for equity in ICT infrastructure in schools, ICTs in education will not be able to improve the living and working standards or life chances of individuals.

It is easy for those who engage with and use technology for education to see its value; it is equally easy for educators to experiment and find innovative ICT applications for instruction when technology is easily and reliably available. Having agreed-upon standards is an important first step, but finding paths to broad integration and equity is a much harder goal to accomplish. The digital divide can never be bridged given the structural ICT inequities that continue to exist in schools and that fall largely along social and economic lines. These international educational inequities cannot be overcome until marginalized communities—those that face the greatest challenges in the classroom—are engaged in the process of finding ICT solutions and producing the instructional technology culture. Cultural production of the values and expectations surrounding ICT integration in education has been carefully crafted with good intent. The rhetoric calling for ICTs in education as a way to create social and economic equity for all students and communities, however, has been less than successful. This might be less a result of those stakeholders who are engaged in the production of culture and more to do with those stakeholders who are not part of that culture.

Appendices

Appendix I: Interview Schedule

Mission, Purpose, and Partnerships

1. Why was the establishment of ISTE necessary?
2. What was/is the process for establishing the ISTE mission?
    a. Has the mission changed over time? Why and in what ways?
3. Why does ISTE work with partners outside of the organization (such as board members, members, etc)? For example, UNESCO, the US Dept. of Education, corporations, etc.
    a. Has the selection process of determining these partners changed over time?
    b. What roles do partners play in ISTE's:
        i. Mission
        ii. Educational standards
    c. Are there any significant differences between national and international partnerships?

ISTE Activities and Goals

4. Why does ISTE provide professional development resources and services to teachers and administrators in the U.S.? Internationally?
5. What is the process for determining these ISTE activities, organizational goals, and resources in the U.S.? Internationally?
    a. How do stakeholders and partners influence these decisions?
6. How are education technology advocacy issues selected?
    a. Does ISTE work with the U.S. Dept of Education to negotiate standards, direction, funding sources, etc.?
    b. Does ISTE work with other international Depts. of Ed and how do these relationships differ from the U.S.?
7. Why did ISTE take over managing the NECC?
8. Why is the ISTE conference now provided in other countries?
9. What is the process for, and who are the stakeholders involved in, determining conference agendas (keynote speakers/themes/breakout sessions) in the U.S.? Internationally?
10. What is the process for selecting articles and topics for ISTE publications?

Technology and Educational Standards

11. What is the most important role that technology plays in education?
    a. In the US
    b. Internationally
12. Why are technology standards important for teachers and students?
13. What guides the development of education technology standards?
    a. In the US
    b. Internationally

14. What stakeholders influence the development of, or changes to, education technology standards?
15. What factors influence adoption of technology in education?
    a. In the US
    b. Internationally
16. What factors inhibit adoption of technology in education?
    a. In the US
    b. Internationally
17. Recently, the standards were updated to include things like digital citizenship, collaboration, etc. What factors influenced this shift in focus?

International Work

18. Why is having an international education technology organization important?
    a. What does being international mean to ISTE?
19. Which international organizations and educational institutions does ISTE collaborate with?
    a. In what ways does ISTE influence international organizations?
    b. In what ways do international organizations influence ISTE?
20. Which countries or international departments of education have adopted ISTE standards?
    a. Is there variation in standards adoption?
    b. What is the process for assessing educational technology needs internationally, and are standards customized or adapted in various ways?
21. Can you identify a country that has adopted ISTE standards with success?
    a. What factors help that country realize success in adopting education technology standards?
22. Can you identify a country that has tried to adopt ISTE standards but struggled?
    a. What factors inhibit that country from adopting educational technology standards?
23. Why does ISTE have international affiliates?
    a. Who are the stakeholders and what is the process for affiliation?
    b. Goals for local participation?
    c. Do all affiliates host conferences or does ISTE have an international conference model?
24. Should there be an international education technology standard?
    a. What would facilitate that goal?
    b. What would hinder that goal?

Future Direction

25. What are key factors that will shape future resources, services, and the organizational vision of ISTE?
    a. Economic
    b. Political
    c. Social
26. How will ISTE's resources and services change over the next 5 to 10 years?

Appendix II: Summary of ISTE Teacher Journal Content 1974-2011

Year	Issue Features	Organization Self-Representation	Editorial Commentary
1974	1st Issue of Oregon Computing Teacher (OCT) -Establishing purpose of OCT and OCCE - Exploring organizational collaboration and advocacy	Oregon Council for Computer Education (OCCE) - foster growth and development of instructional uses of computers - Statewide Consortium of Computer-Using educators - Six members serving on the State Dept of Ed task force on Data Processing: computers in instruction Executive Committee Purpose: - Steer OCCE activities and limited resources - Benefit Membership and State - Collect and Disseminate Info - Be inclusive across state geography and educational representation State Update Article: - "The state should adopt and implement a policy specifies minimal level of instructional computing services be made available to all education agencies on a uniform unit cost basis." - Call for a statewide instructional computing service with affordable staff support and professional development for teachers and pre-service teachers	President Report: - most important mission and responsibility of any group in the state for potential impact on education and society - role of computers in instruction will stop being the sideshow of educational freaks…and will become instead a truly revolutionizing force very central to education and all its facets that will vastly alter our entire concept of what education is supposed to be, and what it can mean to our people and to our country. Moursand Editorial: Where is Instructional Computing Headed? There are two instructional uses of technology: Teaching about computers & Teaching using computers Goals: All students should be computer literate; All students should have access to computer science training Computers should be used for teaching: - computer assisted instruction - computer managed instruction - computer augmented learning Computer Literacy

			instruction should begin in Elementary and include non-technical and social implications - Teaching using computers is one method of helping to develop computer literacy as a byproduct of teaching some other subject matter - To date...teaching using computers has not proven economically feasible on a widescale basis and thus is having a relatively minor impact on education Problems: - No agreed upon goals for instructional computing at various grade levels; Lack of infrastructure (hardware and software); Low levels of teacher computer literacy; Low levels of administrator computer literacy and leadership in the area; Few good quality instructional materials; lack of trained teachers
Sept. 1978	Not formally organized Multiple submitted articles covering class applications		No featured editorial, but article, The Next Great Crisis in American Education: Computer Literacy, Andrew R. Molnar, National Science Foundation - Having an information explosion in science - Shift in economy from industrial-based to knowledge and science-based - wide-spread dissatisfaction with schools - "Computers which have become indispensable to the operation on science, business, and government are not a major part of

			American education" (p. 33). - "In an information society, a computer literate populace is as important as energy is to an industrial society" (p. 33). Problems: declining enrollments in schools; increasing costs per student; ineffective teacher support - teachers are not technologically literate (lacking resources and support) - national test scores sounded the alarm and trend is to go "back-to-basics" - "...statistical indicators show that the United States is fast being overtaken in innovation of new technology by more dynamic foreign economies" (p. 36). - Science-driven innovations spur the economy and create jobs - Computers increase productivity - International competition for leading in knowledge-based industries - "It is clear that if we are to have equity in our educational systems, all students must have access to computing and must become literate" (p. 38). - "Computer literacy is a prerequisite to effective participation in an information society and as much a social obligation as reading literacy" (p. 41).

Feb. 1979	Tips for Using Technology in the Classroom BASIC Programming New Calculators Microcomputers for Instructional Use AI and Computer-Aided Instruction Australian Computer Education Publication Highlight	Oregon Computing Teacher (OCT) (last issue before becoming TCT): Oregon Council of Computers in Education (OCCE)	President's Note (no editorial feature) Advocacy - there is a bill in congress now to set up a national council for computers in education; need for advocacy - accounting National Education Computer Conference: joint conference of 12 national groups aimed at the college and university teachers - the national council of teachers of mathematics (NCTM) adopted a statement of importance for using computers in the classroom in Sept 1976 - 1st NECC announced and there is no connection to OCCE: assembly of 12 organizations interested in educational computing; higher quality of education computing; better education in the classroom
Sept. 1979	Local Computing Resources Computer Awareness in Elementary Schools Accessing inexpensive micros Technology and Changes in Personal Computers Computers and Teachers	TCT: OCCE	Featured Article (no editorial feature): Computers and Teachers "We have found that computing, placed in the hands of well-supported teachers and students, can be an agent for catalyzing educational accomplishment of a kind that is without precedent" (p. 25). "…computers in education are revolutionary because they make possible great teaching in a system dedicated to mass education...they make this possible by supporting the awesome mystery of

			person-to-person educational influence, not by replacing it" (p. 25).
April/May 1980	Elementary School Computer Activities Information Society Computing Problems Calculators Computer Science Curriculum Using Computer Games to Challenge Students Computers as Tutors	TCT: ICCE	Editor's Note: Moursand Welcome Letter Describe ICCE as having two different membership types: - individual and organizational - promoting computers in education with groups, as collectives, is better than having just a single entity - TCT is now a nationally circulated journal, not just for Oregon educators
Aug. 1980	Computer Facilities Use of Calculators Computer Models in Business and Govt Getting Kids Ready for Computer Thinking Instructional Design and Computer-Assisted Instruction Promoting Computer Education	TCT: ICCE - 4 organizational members (1st mention in TCT - now ICCE) - Purpose of TCT: for people interested in the instructional uses of computers; teaching about computers; using computers; teacher education; and the impact of computers on the curriculum	Editor's Note: Moursand - ICCE outgrew their small press, moving to new journal name and format because of growth and demand "The school system that is not involved in instructional uses of computers is now the exception, rather than the rule" (p. 3). but - there is a lack of well-organized attack on major problems - there is no statewide planning and no financial support
1980-81 Vol. 8, #7	Colleges of Education Introducing Computers in Education Degree Programs Technology Keeps Getting Better More Students Have Access Teachers Need Training	TCT: ICCE - individual that subscribe to TCT are members of ICCE - Organizational membership is free - Netherlands and Canada join as OMs	Editor's Note: Moursand Change - rate of growth of microcomputers in schools is increasing - impressive despite cuts in budgets in many schools - who is responsible for integrating computers in schools: colleges of Ed; districts, private industry

			- we must advocate for district-wide plans for instructional uses of computers - computer-using educators must lead
Sept. 1981	Microcomputers: education simulations Software piracy policy Gaming Computer Literacy Curriculum Future of Computer Education Classroom Word Processing Hardware	TCT: ICCE	Editor's Note: Ricketts Instructional Use of Computers & Responsible Use of Computers - there is a lack of federal support for curriculum development and teacher training programs - need to build computer literacy; more skills for using computers to problem-solve; and more use of computers as an aide to instruction - teachers must work individually and collectively to make a difference
April. 1982	Computers and Teaching Apple Software Swaps Computer Accessibility	TCT: ICCE	Editor's Note: Moursand Teacher Computer Literacy - Need to provide computer access for teachers at school and home - must provide self-service opportunities and professional development training
Sept. 1982	Microcomputers in Social Studies Writing Instructional Computer Programs Teaching Problem Solving with Games Interactive Languages Design of Computer-Based Curriculum	TCT: ICCE	Editor's Note: Moursand A Grassroots 'Umbrella' "Officially, ICCE is only three years old. But the roots of ICCE are easily traced back to the summer and fall of 1971 when a group of classroom teachers met to form a statewide organization dedicated to the instructional use of computers. This was a grassroots organization, with representation from

			all education levels and all geographical parts of the state...It remains a grassroots organization, run by classroom teachers and others dedicated to improved instructional use of computers" (p. 3). "ICCE must provide international leadership, but it must represent the classroom teacher" (p. 3). - must become an umbrella organization and serve the needs of members - must be a strong spokesperson for computer-using educators addressing the needs of classroom teachers and administrators; provide professional development - starting Special Interest Groups (SIGS) - Creating more local and regional meetings for teachers with cheap and easy access through the Organizational Affiliates
Aug. 1983	Funding Computer-related Technology in Public Schools Apples in the Classroom The Little School that Could American Computer Science League	TCT: ICCE	Editor's Note: Moursand Hard Issues Left to be Resolved - decreasing number of women in computing classes - increase between have and have-nots of technology - discovering best uses of computers in education - computer literacy - teacher education - software access and cost - quality of software - role of the state and national leadership - publisher control over curriculum

Oct. 1983	Hard Disk Storage Apple Drill Program Language Computer Art Graphics Computer Coordinator Special Interest Group Computer Outreach Education through Entertainment	TCT: ICCE	Editor's Note: Moursand 20 Years Ago - by 1963 the computer industry was already into the second generation of computer hardware - In 1958 computers were already in some pre-college education systems - what does this history show? Different from now? - In the 40s and 50s computer advocates knew that hardware would get better, more reliable, and cheaper - computers will be readily available to students in 20 more years - make long-term investments, fund research, fund curriculum and leadership development - this type of funding is critical for making progress in the field of computers in precollege education
May. 1984	Word Processing Microcomputers Media Centers Changing Student and Teacher Attitudes Through Word Processing ICCE Organization News	TCT: ICCE	Editor's Note: Moursand You Are ICCE: Call for Support - "ICCE is a non-profit professional society of educators involved in instructional uses of computers" (p. 4). - 15,000 members and 43 Organizational Members - in 1979 membership doubled each year, now membership is declining due to increased competition - ICCE is a business - ICCE is a grassroots organization - Organizational members reach educators at the

			grassroots level with newsletters and conferences - No commercial publisher has such a grassroots support system. - Grassroots = Not for profit - Grassroots = volunteers "The essence of the situation is one of non-profit professional societies versus for-profit publishing companies...A professional society is grassroots driven. Its members decide what projects are to be undertaken and how resources are to be allocated. And, critically important, professional societies make extensive use of volunteers" (p. 4). - Volunteers referee articles; write book and film reviews; serve on the board; serve on the teacher certification committee; are unpaid; contribute their time and energy to teacher education
April. 1984	Computer Equity Inequities in Opportunities for Computer Literacy Equity in Computer Education Sex Equity: girls use of computers Access to Computers Practical Solutions to Equity Lowering Barriers to Computer Use	First Theme-based TCT: ICCE	Editor's Note: Moursand Focus on What Individuals Can Do to Create Equity - be personally aware - focus on providing broad opportunity for engagement for all students
May. 1985	Problem-Solving with Databases When Computers are Bad for Kids Teaching Programming Kids on Computers	TCT: ICCE Message from the board: Advocacy is critical among Organizational Members because they can engage in	Editor's Note: Moursand Modems: Communication Via Computers - enable talk via voice or bulletin boards

		informed political activity - political action; education; consulting	- facilitate telecommunications - use remotely-located computers - interactive computing - Accessible databases - electronic bulletin-boards and electronic mail - all allow new modes of communication around a variety of topics with strangers
Aug. 1986	Computers in Early Childhood Word Processing Cooperative Learning for Effective Mainstreaming	TCT: ICCE ICCE Updates: - added committee to enhance the international aspects of the organization - added committee to become an advocacy group through a legislative action committee - ICCE formally takes over the administration of the NECC conference (1986-1987)	Editor's Note: Moursand The Future of Computers in Education - all teachers already know importance of teaching information and how to solve problems in education - computers are just tools to help store and process information, computers are tools like a pencil or book - you must teach students to learn these tools and allow for routine use and practice - the type of tool used helps to shape the process of learning: solving "...intellectual problems is intertwined with the intellectual tools one uses" (p. 4). Future of Computers in Ed: 1. all students will grow up with computer-rich environment with easy access at home and school 2. curriculum must adjust to accommodate kids who grow up with computers 3. computer-assisted instruction will grow steadily 4. educators will need to adjust to the changing

			curriculum, instructional environment and students - in 15 yrs will there be more money and professional development to reach full potential? "...I will be able to use the same paper five or 10 years from now, making only a few changes to reflect some details of technological progress" (p. 4)! - as of now teachers aren't changing their instruction to match future needs - computers aren't having much of an impact on the content or pedagogy of curriculum - computers are just an add-on on existing school curriculum - teachers must be involved to make true educational change and improvements - integrating computer usage into everyday content and pedagogy of the ordinary classroom - move it into the information era
Apr-87	Telecommunications Stakeholders and Change Online Networking Bilingual Education and telecommunications Intercultural Learning Network	TCT: ICCE	Editor's Note: Moursand Long-Range Planning for Computers in Schools -"There is little discussion of fundamental changes needed to make education more appropriate for life in an Information Age society" (p. 4). - need a 5-yr long-range plan - need visionary goals: examining what role computers should play in schools - examine curricular changes that lead to more

			individualized learning opportunities - these goals must be linked to district education goals overall - must have early and major involvement of a large number of stakeholders in the process - including all of the people that will be involved in helping to implement the goals or who will be impacted by the plan (teachers, admin, parents, taxpayers, community leaders, students) - the goal is to develop broad-based ownership of the long-range plan "Computer technology can be the basis for major changes in schools, but without such broad-based involvement and support, these changes will not occur" (p. 4).
Aug. 1987	Artificial Intelligence: applications in education Developing higher-order thinking skills Teaching kids to teach themselves Action for Equity	TCT: ICCE	Editor's Note: Moursand A Quest for Excellence in Education - there is now at least one microcomputer per teacher - Are computers helping to improve our education system? - students are computer literate - is computer-assisted instruction (CAI) increasing? - CAI could help lead to individualization of instruction and mastery of learning; would change teacher from deliverer of information to facilitator - computers are a change agent - a tool

			"It is not inherently true that increased use of computers in schools will improve our education system" (p. 5). - use of tech could even cause decline in education strides if not used effectively - use of tech could also be a waste of money "...resources being put into computer hardware, software, and staff development are begin diverted from other potentially more fruitful uses" (p. 5). - We must strive for excellence - not mediocrity - [my note: what is not being asked here is what would benefit teachers most? How best can teachers get engaged?]
1988 Conference Issue	Special Conference Issue Software Copyright Statement Higher-Level Thinking Skills	TCT: International Council for Computers in Education About ICCE: founded in 1979 …"as an organization that would foster appropriate instructional use of computers throughout the world" (p. 5).	From the Editors: TCT is the journal of ICCE - national and international professional organization - for computer-using teachers, teacher educators and computer coordinators - focus on improvement of education through technology - TCT is the voice of participating educators "The computer education movement is carried by its participants. Let's unite to share our efforts, successes, and failures. Let's carry this movement forward to improve learning opportunities for all" (p. 4).

Aug. 1988	The One-Computer Classroom Action for Equity: one-computer homes International Connections: sharing global ideas on using computers in education (focus on European electronic networks)	TCT: International Council for Computers in Education	Editor's Note: Moursand Education would be better if - teachers had more social status - society valued education more - teachers were more professional - teachers were life-long learners - teachers had opportunities to observe master teachers at work - more and better inservice were made available - administration and school boards quit interfering and assigning non-teaching duties - teachers don't have enough time - teachers don't make the effort - technology is not available - "If we want to facilitate increased use of computers in schools, we need to do things that make it easier for teachers to learn to use computers and to use computers in schools" (p. 5). Solutions: 1. Give teachers computers at school and home 2. Provide 1-1 informal peer instruction 3. Allow time for observation of computer use in classrooms 4. Provide access to professional development to learn

Nov. 1990 & The Conference Issue 90-91	Private Funding Database Yearbooks for 2nd Grade Videodisks: the Next Temptation Teaching Non-recursive Binary Searching	TCT: Journal of The International Society for Technology in Education (ISTE) Memberships: Private Sector Council Professional Basic Institutional Organizational and Affiliate	Moursand Editor's Message: Letter to Teachers - Being a teacher is a challenge in best of times - More difficult now: tight budgets, increasing expectations, rapid changes in society - Rapid progress of technology - Educational system is not dealing well with computer related technology - Computers are a powerful aid to instruction - How well are you, as a teacher, coping? Do your students use computers to explore and solve problems in your discipline? Are students empowered by computers? Do you make appropriate use of computers as an aid to teaching and learning? If you say, no, you are letting your students down. - You have a deep professional responsibility to become computer competent, you owe it to your students to help them learn to make effective use of computers as an aid to problem solving and learning. Learn by doing. - Our educational system is at a major turning point, and you are a key player in the changes that are occurring. Take a leadership role.

Feb. 1992	Electronic Hands Across the Ocean: telecommunications project Educational Technology Leadership Using Computer Power to Improve Your Teaching Software Packaging for Real Kids Making Yourself Presentable		Moursand, Editorial, Restructuring Education, Part 5: America 2000: An American Strategy - Reaction to President Bush's America 2000 initiative which proposed six long-range educational goals (preschool safety, high school completion, student achievement - Calls for competency testing at 4th, 8th, and 12th grades in English, Math, Science, History, and Geography. - There are important things missing to suit the Information age: foreign language requirements, the arts, international studies - focus is on basic subjects not on interdisciplinary problem solving. - Testing is shaping curriculum - content and process is being designed to raise test scores for national assessments. - Calls for 'authentic-assessments' - performance based tests Moursand, Editorial, Restructuring Education, Part 6: A New Definition of Computer Literacy - The personal computer is commonplace in homes and at work - 1 microcomputer per 12 students in US public schools - Computer literacy for restructuring must include literacy in multimedia (computer-based digitized media) production -

			knowledge and skills to communicate, to learn, to know, and to apply one's knowledge
May. 1993	Optical media Mining the Internet Power Tools for Math and Science		Moursand, Editorial, Design of User Interfaces - Teach students about design and function of computers and applications - Design and user interface should be integrated in all curriculum areas
Feb. 1994	Telecommunications in the Classroom Create a Student-Centered Multimedia Classroom Learning Mathematics with Flight Simulator The Urban Child and the AT&T Learning Network		Moursand Editorial: Technology Education in the Home - "This year's editorials all focus on one specific problem - the inability of our educational system to adequately deal with the very rapid Information Age changes that are occurring throughout the world" (p. 4). - "The total installed base of microcomputers in the United States is now one microcomputer per four people - about half the density of installed telephone lines" (p. 4). Mostly in business and government but growing in homes. - "It is clear that we now have many students in school who have grown up in a computer-rich home environment and whose knowledge of this technology far exceeds that of most of their teachers...but who have not had appropriate guidance in learning to make use of this access"

			(p. 4). - Need to develop a parental support structure Integrating Technologies Into Schools: Why Has It Been So Slow? Six reasons why successful integration happens: 1. administrative support and leadership 2. pedagogical orientation of teachers 3. quality of professional development 4. ability to establish outside collaborate partnerships 5. work within an agreed-upon technology integration plan - Teaching with technology must allow for student-centered learning and active learning. - Inservice training often do not relate to actual teacher needs - "'The idea of teachers learning and working together on a school site to solve problems unique to that site is a powerful one...effective technology integration will only become reality when 'shared decision-making becomes institutionalized in the life of the school'" (p. 7). - Technology plans no longer relate to developing computer skills. Now the focus must be on wide stakeholder involvement in long-range planning tied to school-wide goals.

Sept. 1994	Incorporating policy and leadership magazine content into TCT New Magazine Layout Introduced: Features include classroom applications of technology Technology in the Curriculum Educational Policy and Leadership	New format and layout of magazine Incorporate the content from a policy and leadership quarterly magazine previously published separately, into TCT. "…highlights the urgent need for teachers, administrators, and teacher educators to operate as a team when they go to work for our schools and kids. It also reflects ISTE's evolution from a largely grassroots organization to one that works at all levels nationally and internationally to support appropriate use of educational technology" (p. 4). Now, "The Journal for Technology-Using Educator" - not "Computer-Using Educators" Changes in ISTE Membership section: "The International Society for Technology in Education provides an interactive forum for national and international dialogue concerning the appropriate use of technology in education. We support the unique needs of educators by improving access to instructional tools, initiating and endorsing relevant legislative policy issues, and holding special conferences" (p. 4).	Moursand Editorial: Progress and Evidence in Educational Technology - Answers questions from readers What is the best thing you have seen happen with computers in education? - Computers are cheaper and more user friendly. Perfect for children because they "create a rich, learn-by-doing environment in which children can explore, pursue their own interests, and take a greater ownership of their own learning." Which areas show the slowest progress? - Teacher education is not addressing challenge of computer technology. New teacher graduates are computer-illiterate relative to the standards need for current educational uses of computers. - Is there solid evidence where computers have made a positive difference in education? - Inconclusive if technology has made a positive difference, but the question is irrelevant. The fact is, students are expected to use computers in the workplace and we need to give them the opportunity to learn how to effectively use them in schools.

April. 1995	The TCT journal is being renamed "Learning and Leading with Technology" Multimedia: Why and Why Not Construct Knowledge with Multimedia Making Networking Connections Developing Technology Workshop Series	Editor provides introduction to rationale for the new journal title: - 1974 OCT was created with a narrow focus of serving computer-using teachers in Oregon - 1979 TCT became the flagship publication of the International Council for Computers in Education - broadening the scope but still focusing on computer-using educators - 1989 The International Council for Computers in Education and the International Association for Computing in Education merged to become the International Society for Technology in Education: worldwide professional society focuses on all forms of computer-related technology in education - May 1995 TCT takes a new name, Learning and Leading with Technology: Learning includes practical applications for incorporating technology into the classroom; Leadership reflects the policy and leadership articles to address the restructuring of school required in the Information Age; Technology, convergence of all forms of electronic media - digital audio, video, and data communication technology "Learning. Leading. Technology. These are key concepts for education. I am proud to be associated with a periodical that is helping to lead our educational system into the 21st century."	Moursand Editorial: Learning Software, Constructing Knowledge - Constructivism: people build new knowledge and skills based upon their prior knowledge and skills - the opposite to 'empty vessel' pedagogy theory that "fits well with a top-down determination of curriculum content and with an industrial age, mass production model of instructional delivery...does not adequately fit the needs of learners in the Information Age" (p. 5). - The focus should not be about teaching students how to use a piece of software, as a focus of the course. Instead, students should construct their own knowledge by learning in an environment that allows them to explore how the software can help them learn and solve problems within a given context.

Oct. 1995	Cyberspace Driving Lessons Student-Created Virtual Tours Mining the Internet Electronic Portfolios Portable Computing Technology Classroom Design Preparing Students for the Future: Project Presentations	Learning and Leading with Technology: The ISTE Journal of Educational Technology Practice and Policy	Moursand Editorial: Distributed Intelligence - Distributed intelligence - a combination of people and computers networked together and supported by software designed to help the overall system carry out activities that require intelligence. Includes AI and groupware software for increased collaboration. - Problem-solving with groups versus individuals - Computers and access to information allow collaborative problem solving of complex problems - Distributed intelligence system - power of group learning - Schools can encourage cooperative learning and problem solving - Networking infrastructure to increase and improve communication - Emphasize learning to represent, communicate and solve complex problems across the disciplines - Learn the power of computer tools (databases, spreadsheets, graphics, word processing) to facilitate this type of learning and collaboration - Focus on problem-solving and computer-assisted design as aids in process
Nov. 1995	Integrated Curriculum Technology-Driven System Change Windows 95 What is the Internet Technology and Professional		Moursand Editorial: Computers in Schools: Effective Practices (Part I) - What are good arguments that computers make a difference in

	Development Levels of Technology Implementation		education? - Computers are better tools for solving contemporary problems - People need better tools to meet higher standards and more demanding tasks Editor Note at the end of the editorial: The National Foundation for the Improvement of Education (NFIE) has received funding from Microsoft founder and CEO Bill Gates to carry out a project titled "The Road Ahead." NFIE is a nonprofit educational foundation created by the National Educational Association in 1969. NFIE has subcontracted with ISTE to conduct research and evaluation on this project. Some of the ideas in this series of columns on computers and effective practices are based on this research.
May. 1996	Learning to Telecommunicate: Distance Learning Projects in Less-Developed Countries (LDCs) - Need to transfer technology from the haves to the have-nots and from developed countries to the LDCs - "...it is imperative that the southern hemisphere engage the northern hemisphere in a dialogue about our common future and be given the opportunity to share in the resources of...spaceship earth" (p. 67).		Moursand Editorial: The Connectivity-Based Revolution - Computer networks are seen by visionaries, like Steve Jobs, as producing a revolutionary change, largely brought on my microcomputers - Bandwidth for connectivity is growing - Connectivity is growing (Personal Computing Devices: personal computers, battery-powered personal digital assistants, cellular telephone) - Networks are a storage

			device - it doesn't matter where you are or what device you are using to access the network - how good of a solution this is depends upon bandwidth of the connectivity and the size of the documents - Java programming language allows for common cross-platform software use - For education: we want students, in Information Age, to learn to solve complex problems and accomplish difficult tasks - Must integrate both computer use and networked computer use into the curriculum
Sept. 1996	Problem-solving activities Collaborative projects Creating safe Internet access Going Global: Desktop video conferencing Attention, Teachers! Join the 21st Century Teachers Challenge - 21st Century Teachers is an initiative announced by President Clinton: a new voluntary corps of 21st Century teachers with the mission 'to help all teachers learn how to use new technology to improve teaching and learning in every school, classroom, and home in America' (p. 5). - "President Clinton said that 'our challenge is to provide Americans with the educational opportunities we'll all need for this new century. In our schools, every classroom in America must be connected to the information superhighway with computers and good software	Changed journal tagline: Learning and Leading with Technology: Serving Teachers in the Classroom	Moursand Editorial: How Long is a Cyberspace Year? Informal study with graduate students found most to believe: - A cyberspace year is about three months long…things seem to change in cyberspace about four times faster than in ordinary 'human space.' - An education-space year is about 36 months long…one-third as fast as in ordinary human space - Relative rate of change in cyberspace and education space differ by a factor of 12 Informal research with administrators: - cyberspace year is about two months in length and education space year is at least 36 months - change in cyberspace is at least 18 times faster than

	and well-trained teachers' (p. 5). - Technology Literacy Challenge: Teacher PD; effective and engaging software and online learning resources as part of curriculum; access to modern computers for all teachers and students; every school and classroom connected to superhighway		rate of change in education space - Cyberspace and education space are closely related: a virtual library of ICTs being used as aids to solving problems and accomplishing tasks - Need more teacher PD - Need increase in funding for ICTs in schools - ISTE developed technology standards adopted by NCATE for pre-service teachers ISTE has received a planning grant from NASA to develop national information technology standards for students: schools will use these to modify curricula and will contribute to improvements in our educational system
Feb. 1997	PowerPoint Presentations Creating Educational Web sites Concept-mapping software Videoconferencing: The Future of Technology in Education Adaptive Technology: Unleashing the Power of Technology for All Students Technology as a Core Value		Moursand Editorial: The Emerging Global Library - The educational system needs to provide students with appropriate access to Global Library and instruct them on how to use it - Every student needs to become competent as a researcher - Curriculum, assessment, and instruction must align with and support the emerging Global Library - Teaching should be less about tasks a computer can perform and more on what a person can do
Nov. 1997	Evaluating Information from the Web Project-Based Learning Connecting Classrooms Around the World		Moursand Editorial: Alternate Histories - Children readily adapt to new technology, but adults struggle with such change

	Teaching on the Internet Collaboratively Internet Discussion Groups High-speed Internet and Rural Schools How Does Technology Influence our National and International Report Cards		- Children growing up with computers can gain fluency more quickly than teachers - Students and teachers should thus collaborate for all to contribute and learn together - also helps students learn about change
May. 1998	Storyboarding Web sites Using the Internet to Teach Project-Based Learning Comparing Distance-Learning & Face-to-Face Courses Planning Staff Development Web Research Skills		Moursand Editorial: Project-Based Learning (PBL) in an Information-Technology Environment - Information technology (IT) has added new dimensions to PBL and increased its value in curriculum, instruction, and assessment - Characteristics of IT-assisted PBL: leaner-centered; authentic content and purpose; challenging; involve design and development of a product, presentation, or performance; require collaboration and cooperative learning; allow incremental and continual improvement; teacher-facilitated; explicit educational goals; rooted in constructivism
Oct. 1998	Electronic Portfolios Using Real-Time Science Data Finding Money for Technology Generation X Presentation Software and the Single Computer Who is Doing What on the Internet Dynamic HTML Visual Literacy	ISTE begins advertising Learning and Leading Magazine on the Web www.iste.org/L&L	Moursand Editorial: Try IT - Maybe You'll Like It - Computers are an innovation, such as cars, radios, TV, and smallpox vaccinations - Everett Rogers Diffusion of Innovations (1995) research examines adoption of innovations - Culture impacts adoption of innovations and it is difficult to change - IT is a complex innovation

			(unlike color TV or radio): school adoption of IT requires significant changes in curricula, instruction, and assessment. It requires some group consensus to get needed funds and make changes in infrastructure. It takes substantial staff development and infrastructure, and it changes rapidly. - Other schools do not adopt IT for other reasons: requires considerable change in the culture of teachers - from lecturer to facilitator - it goes against what is commonly accepted as the role of teachers - Wide-scale adoption of IT-assisted PBL is now possible and provides a low-risk opportunity for teachers to try using IT
April. 1999	Project-Based Learning Web Quest Questioning Strategies for the Information Age Online Projects	Learning and Leading with Technology: ISTE	Editorial: Moursand Enhancing Your Opportunities to Learn - everyone is a lifelong learner - must become more efficient learners of information technology (IT) What does it take to learn: - appropriate and timely access - feedback - time and effort - opportunity to apply knowledge and skills Traditional in-service professional development does not afford teachers much of an opportunity to do any of these things - it is up to each teacher to

			engage in self professional development, learning and growth- professional responsibility of every teacher to increase knowledge and practice of IT in teaching - ultimate goal is for your students to learn to solve problems and accomplish tasks in ways that make good use of IT tools - like project-based learning (PBL) - in IT-PBL environment teachers learn from students and students learn from each other and teachers build upon current knowledge and skills to make immediate use of what they are learning as well. - districts are overwhelmed and cannot support traditional PD anymore - and IT can be learned better and more effectively in other ways - create IT learning experiences that meet your specific needs.
Nov. 1999	Models for Professional Development Integrating Technology From Computer Lab to Technology Class Linking Educators to Learning Professional Competencies for the Digital Age Classroom	L&L: ISTE	Editorial: Moursand Lifelong Learning - Shaping the present and future of IT in education - cuts across disciplines, effective use of IT; and enduring value - Lifelong learning: learning as a limited-time endeavor worked in the past, but no more; with fast technological and societal change lifelong learning is required - Learning to learn and working towards being independent, self-sufficient are key

			education goals now - IT is has contributed to this fact and is also a solution for addressing it - explore ways to help students engage and explore how to be self-sufficient using technology and to become lifelong learners.
Sept. 2000	Problem-Based Learning and Technology Standards Help Outside the Classroom Online Adventures Streaming Video on Your Web Site	TCT: ISTE First mention/connection between feature (PBL) and NETS	Editor's Note: Moursand Roles of IT in Improving Our Educational System - Has teaching and learning improved over the past 5,000 yrs? - we know that students perform better when they have personalized tutors but we can't afford to have this for every student - Computer-assisted learning has potential to reach similar outcomes - students can and should be taught at a higher standards - CAI is an approach that can help improve our educational system
Feb. 2001	Closing the Digital Divide From the Fields to the Laptop Migrant ESL HS Students Succeed Using Networked Laptops Meeting Professional Growth Targets	L&L: ISTE	Editor's Note: Moursand The Learner and Teacher Sides of the Digital Divide - the Digital Divide problem goes beyond access: it isn't a money solution - the real problem lies within our educational systems - IT needs to be blended into other instruction to extend it (math, writing, science) to extend a student's overall fluency in communication and thinking - NETS standards help define IT content areas

			necessary to achieve IT fluency for students and teachers; note importance of IT across the curriculum - to achieve IT fluency we must change curriculum and integrate IT at all levels - teachers must be fluent and confident in IT - kids without opportunities to build fluency at home are also at a disadvantage (like not having books at home) - contemporary standards for IT fluency will continually rise - which will continue the gap of the divide; must bridge the divide between schools and home together
May. 2001	Writing Great Web Quests Bridging the Digital Divide Telecollaborators Wanted Online Education in a War Zone		Editor's Note: Moursand (last Editorial for Moursand Sept. 2001) The Innovative Educator's Dilemma - compares Christensen's "The Innovator's Dilemma", 2000 to education - well-managed and successful companies are ruined when they don't make good adjustments to the changing technology - ed system isn't adjusting to changes and better tools to accommodate needs of today - having a factory design for mass producing students through education is no longer sufficient for success - mass production education feeds into standards-based testing - the dilemma for schools

			is that IT obviates many design considerations of current ed system - change within a school or school system to accommodate and build upon IT changes is difficult: diverts resources needed to maintain and improve current practices; creates dissatisfaction among stakeholders; creates competition for the current ways of doing things -some leaders and teachers are aware of benefits and need to change but don't - what can be done? create independent schools within schools (magnets, charters, alternatives): needs startup capital and resources and will be more expensive but can demonstrate success and required change to serve as model for widespread change.
Jan. 2002	Online Professional Development Classroom Dynamics in a Technology-Rich Learning Environment Building and Using a Web Database Opening Doors to the World		About this Issue: Anita McAnear Moving Toward Proficiency - educators have a long way to go in becoming proficient in the use of IT 'language' (integrating technology into curriculum, instruction, and assessment) - preservice and inservice teacher ed programs can't keep up - online professional development can be an option (benefits and drawbacks) - 'hot house' environments where teachers and

			students can use and test technology and learning environments (such as Apple Classroom of Tomorrow) help us learn more about what works and doesn't - ease of use of technology will help - benefits integrating technology across the curriculum areas
May. 2002	Ubiquitous Computing Refining Your Online Course Finding the Right Handheld Computer Creating a Flexible Wireless Network Using Research for Technology Planning Preparing for the Technological Tipping Point How Does Technology Influence Student Learning?		About this Issue: Anita McAnear Moving Toward Ubiquitous Computing - at the tipping point where all students will soon have access to technology anytime anywhere with affordable portable wireless computers - teacher education is at a tipping point where teacher preparation for effective tech integration is being achieved through federal grant support, NETS development, NCATE requirements, teacher educator alliances for technology integration - focus on tech integration, not tech skills development - focus on funding for staff development for tech integration - Ubiquitous computing turns the digital divide into a digital 'learning' divide: every student can have access but knowing how to take advantage of the access is what is important - access alone doesn't empower students to develop skills in lifelong

			learning, critical thinking and problem solving - handheld devices, online learning, research in ed tech, and empowering students and providing them with opportunities to learn, problem-solve, and contribute to their communities and world will help efficient and effective use of ubiquitous technology
March. 2003	Technology Planning 7 Steps to Successful Online Learning Communities Online Tools Open to the World	L&L: ISTE	In this Issue: Anita McAnear Technology Planning for Systemic Reform (part of 30 volume celebration - looking at past, present, future) - Infrastructure still lacking because lack of funding to maintain and replace equipment - technology is getting faster, cheaper, and smaller - ubiquitous computing is coming - most teachers and other ed professionals have a basic level of skills to build from in using technology - project-based learning and other pedagogical models are advancing - curriculum is probably not taking good advantage of present technology so ubiquitous computing may not fulfill its promise - with the right technology planning and implementation could make adequate yearly progress of using technology to improve teaching and learning - 1st and 2nd stage are

			exploring technology and building infrastructure. The 3rd stage is brings systemic change - brought about by administrative support & guidance; creating a community of learners; project-based learning; use assessments and data-driven decision making to help foster school reform to assess teachers' knowledge of technology and its use in teaching and learning - ISTE's book, NETS-T Resources for Assessment includes tools for gathering performance data, rubrics, and strategies for formative and summative assessments. - new federal mandates have changed the rules for adopting education technology interventions and the roles of district and state ed tech decision makers
Sept. 2004	Digital Citizenship: Addressing Appropriate Technology Behavior Internet Access: Spanning the Last Mile Fighting Spam Leadership as Service Curriculum Design and Technology Integration Project-Based Learning	L&L: ISTE Added a new Professional Development column in journal Advertise ISTE Institute: PD for "Powerful Professional Learning for 21st-Century Schools" - focuses on essential 21st-century skills and deep technology integration - aligns with federal mandates and state content goals - models evidence-based and data-driven decision making - provides high-quality mentors from a trusted source	Issue Oriented: Anita McAnear Innovation and Change - discuss winner of the Sylvia Charp Aware for District Innovation sponsored by T.H.E. Journal and ISTE -the winning district has 60% of its students economically disadvantaged but has achieved second highest level of state's accountability rating - the district uses a web-based software tool that allows teachers to analyze their own test data and conduct assessments of

			NCLB - district meets NETS essential conditions - all 8,000 high school students get their own laptop and moving towards one-to-one for all students 3rd-8th grade - teachers use Blackboard LMS to support their face-to-face instruction; use videoconferencing and software tools; technology & media fairs and robotics contests - displays innovation in schools - need to scale up these models so that all students can achieve their potential - key challenge: getting computing power in into the hands of all students in all schools
March. 2005	Video Streaming on the Cheap Putting Blogs to Work Bringing Handhelds to Your District	L&L: ISTE ISTE Professional Development Programs Strengthen 21st Century Leaderships Skills "Partner with ISTE to implement the National Education Technology Plan: With the release of the National Education Technology Plan, ISTE's commitment to leadership is more critical than ever. We've worked closely with the U.S. Department of Education to shape and refine the plan's scope and guidelines. And we continue to be our members' voice in the Plan's dissemination and implementation strategies." NETS Foundation; NETS Integration; NETS Implementation for Systemic Change; Assessment and	Issue Oriented: Anita McAnear Putting it All Together - there are so many computing devices, multimedia delivery systems, how can we ensure that students and teachers always have at their fingertips the right tool for the learning task and an integrated system that puts data, resources, and delivery systems together - Seven action items of US Dept of Ed's National Education Technology Plan calls for integrated data systems: use data from admin and instructional systems to understand relationships between decisions, allocations of resources and student

		Technology Workshop; Best of NECC Workshops; NETS for Teachers: Train the Trainer Workshops	achievement and use assessment results to inform and differentiate instruction for every child
Oct. 2005	Help Teachers Embrace Standards Costa Rica: Ahead of the Curve Connect Curriculum and Technology Computer-based Testing Preservice Partnerships Create Classroom Leaders	L&L: ISTE	Issue Oriented: Anita McAnear Holding Ourselves Accountable - the standards movement has raised the topic of accountability in education - technology allows us to record, analyze, and communicate the data needed to hold us as educators accountable - technology allows enables us to use data to drive our decisions; provides evidence for accountability - who are we accountable to? - stakeholders from students to schools boards to government agencies - one effect of NCLB is to make educators feel accountable to test results and lose the desired end of all students achieving at high levels; need to keep focus on students first to achieve the best results and balance; want students to achieve their potential and be prepared for the future - focus on higher-order thinking skills, collaboration, and technology skills, along with basic skills - must work to find what motivates each student; look for ways technology can help

			- gather data that will help you figure out what motivates each student - determine what the students already know - Have the final goals in mind for students: to develop their full potential and ready to create and shape their future: what constitutes mastery - backward design for educators - what data do I need to collect that will show progress or lack of it? How do I gather it? how do I analyze it?
April. 2006	Designing a 21st Century School Bridging the Digital Divide Getting Girls Interested in Technology Careers Can Games Be Used to Teach? Collaboration in a Web 2.0 Environment Equity in Ed Tech Cutting the E-Mail Clutter	L&L: ISTE	Issue Oriented: Anita McAnear Equity in Practice - important to survey your students to know what type of access to technology they have at home and how they use technology -identify gaps and work with the students to discover solutions (find donated computers, local expertise, local resources, etc) - admin and tech coordinators can help and teacher educators can make their teacher candidates aware of equity issues - everyone has a role to play in addressing equitable distribution of resources for students and we can't wait for fund to materialize for one-to-one for all students.

May. 2006	Succeed with Collaborative Apprenticeship Pave the Way with ISTE's Institute Craft Effective Digital Products Has the Gender Gap Closed? Portable Data Empowers Leaders Identifying Key Research Issues Craftsmanship of Digital Products	L&L: ISTE	Issue Oriented: Anita McAnear Promising Directions for Staff Development - Three promising directions: - Develop a Community of Learners: online PD for continuous development rather than isolated trainings, personal and focused; share latest learning theory, engage in curriculum mapping and developing essential questions, analyze key issues - Embed Technology: integrate tech with all staff development and theory on how students learn: supports inquiry-based curriculum around essential questions, supports research-backed instructional strategies, supports teachers getting to know their students, supports metacognition and content learning - Employ Mentors: foster technology integration, inquiry-based learning and other instructional strategies; tech coordinators can spread expertise, introduce new tech applications with relation to specific curriculum goals - requires collaborative effort among admin, curriculum specialists, tech coordinators to benefit teachers and students - These efforts will help students and teachers take advantage of technology as an accelerator for change

			and moves forward school reform efforts
March. 2007	NETS Refreshed Project-Based Learning Around the World: Microsoft and ISTE's Partnership Should Schools Regulate Onsite Behavior? Ed Tech and Social Justice	L&L: ISTE	Issue Oriented: Anita McAnear Digital Citizenship - Newly released draft of refreshed ISTE NETS-S: Digital Citizenship is the new name of the Social, Ethical, and Human Issues standard -"Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior" (p. 4) - all educators at all levels must focus on their role in achieving this standard - must educate ourselves and our students - education in digital citizenship empowers students to protect themselves online - cybersafety should be integrated into the curriculum
Nov. 2007	Kids Address Global Challenges Solve the Tech Integration Puzzle School-Corporate Partnerships Is Chatspeak Destroying English?	L&L: ISTE	Issue Oriented: Anita McAnear Educators Are Going Global - global initiatives and collaboration made it into the hottest topics at NECC for the first time - media attention around global issues and challenges and press around Thomas Friedman's "The World is Flat" is raising attention - collaborative aspect is important: global workforce will require

			dynamic, multicultural teams; solve global challenges - Web 2.0 tools make global collaboration easier (blogs, wikis, nings, Twitter, Skype, texting, audio/video chats and digital publishing and broadcasting) - can use these tools to collaborate with other teachers globally, connect students globally, and integrate social entrepreneur projects into the curriculum
Nov. 2008	Café Style Staff Development e-waste Getting Girls Excited about Project Management Are Free Tools Worth the Price?	L&L:ISTE	Issue Oriented: Anita McAnear Implementing NETS-S - retrospective on NETS-S work in 1998 - was bare bones then: Purpose, Description, Activities, Standards, Tools & Resources, and Assessment were the sections - no discussion of essential questions and why students should care: differentiating content, process, and product; instructional strategies; prior knowledge of students; prerequisite skills; closure and reflection - understanding how people learn, influences of design and differentiated instruction were not part of teacher prep for a lot of teachers - teaching technology skills to teachers does not by itself help teachers integrate technology into their teaching: it makes

			sense to think about curriculum design with technology, using all we know about how the brain works, how people learn, and good curriculum design - the new NETS-S can be incorporated into lesson/unit plans with resources on ISTE website - designing good lessons that incorporate all that we know about teaching and learning supported by technology is not easy - authentic assessments requiring students to generate new knowledge is also difficult - a team approach with good support and scaffolding of the key elements might be one solution to help - educators planning school and district staff development around implementing the NETS might want to consider supporting groups of teachers working together on lesson development: identify essential questions and do curriculum mapping, then lesson/unit development, then Web 2.0 tool integration
Feb. 2009	Transforming Education Through Online Learning Global Connections: collaborate anytime anywhere Turn Lesson Plans into Online Courses Ahead of His Time: 30 years of Dave Moursund's Writings Still Relevant Today Should Public Schools be Required to Offer K-12 Online	L&L: ISTE	Issue Oriented: Anita McAnear Let's Welcome, Not Fear, Online Learning - the revolution is coming according to Clayton M. Christensen, "Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns" - online high school

	Learning?		courses are the disruption - student-centric learning, improving education research, and leadership tools to foster innovation are critical - disruption also leads to innovation - this is not about digitizing current courses but about using all the tools possible to differentiate learning for students - entrepreneurial endeavors focus on 'clients' to engage them in learning and provide whatever is necessary so they continue in the course and complete it - results in innovation from admin and funding to meet the individual needs of students - we can use technology (not just online courses) to help every student: search online for content, tools, or a tutor to help with difficult concepts; create those tools ourselves and share them. - Web 2.0 tools and social networks are helping educators organize, collaborate, and share and tackle difficult challenges
Dec. 2009	Become a Digital-Age Leader Computing in the Cloud Partnering with IT Students Weigh In on Facebook vs. F2F Envisioning the Future	L&L: ISTE Dave Moursund: Envisioning the Future: final installment of ISTE's yearlong commemoration of ISTE's 30th anniversary -	Issue Oriented: Kate Conley Everyday Leaders - good leaders are: committed, compassionate, confident, use their influence to help others develop leadership abilities, willing to learn and take risks, inspire others to be and do their best, operate with integrity

			and model examples, listen to others and help organize and articulate diverse opinions - same characteristics of a good educator - learning how to use technology and showing a colleague, or speaking up in a staff meeting are forms of leadership - for many teachers making the shift from sage on the stage to guide on the side requires significant change in definition of leadership: making this shift is one of the biggest changes we need to make in how we support technology integration
March. 2010	Tech Savvy in the Developing World: Lessons from the Global South: mobile technologies Interactive Virtual Field Trips Is Internet Access a Basic Human Right? Digital Citizenship and Empowering Student-Centered Learning		Editorial, Kate Conley "Issue Oriented" We're Not in Kansas Anymore - Digital Citizenship: preparing students for the world they will graduate into - Attempt to establish norms of behavior with regard to technology use, especially online - NETS-S focus: students should "understand human, cultural, and societal issues related to technology and practice legal and ethical behavior" (p. 4). - teachers need to empower themselves with digital citizenship skills to help students be successful

Aug. 2010	Expand Your Laptop Program: a professional learning community approach Computer Science: need more in schools Is Technology Killing Critical Thinking Creating a culture of conservation		Editorial, Anita McAnear, Issue Oriented Learning Communities for Effective Technology Implementation - Collaboration among teachers and admin is critical to implementing one-to-one laptop programs - Essential conditions for ISTE's NETS for learning (leadership at all levels; infrastructure; policies; implementation plans encouraging collaboration and communication among all stakeholders; strong professional development programs; professional learning communities; technology and curriculum coaches) - Highlights districts that have had success because they implemented the essential conditions
Nov. 2010	Culture of Collaboration for Student Success Teacher Educators in New Zealand Use Devices to Engage and Challenge Students What Do We Mean When We Say 21st Century Learning The Always-Connected Generation Is it Time to Switch to Digital Textbooks?	"ISTE is the premier membership association for educators and education leaders engaged in improving learning and teaching by advancing the effective use of technology in PK-12 and teacher education" (p. 4). Focus of editorial on NETS "Communicate and Collaborate"	"Issue Oriented" Anita McAnear Communicating and Collaborating for Student Success NETS category of Communication and Collaboration is focus - Districtwide focus on communication and collaboration is important for integrating technology and reaching learning goals of the digital age - Teachers collaborate to teach each other technology skills & model use of digital age tools for communicating and collaborating - student-centered lessons focused on developing

			higher-order thinking skills using digital age tools - Mandating helps successful integration but when teachers can see value they are encouraged to engage on their own - Keep communication and collaboration focused on students' desire to learn by figuring out what motivates individual students and encouraging curiosity as well as discovery and understanding
March/April. 2011	Libraries and Digital Age Instruction Computational thinking Cyberbullying Connecting to the World Collaboration Makes the Ed Tech World Go Around Harness Technology to Meet Your Students' Diverse Learning Needs Become a Better Advocate for Ed Tech Collaborating with the World	ISTE is striving to build global fluency by translating books and webinars in multiple languages; working with NGOs and ministries of education to advance excellence in learning and teaching.	"Issue Oriented" Kate Conley Connecting to the World - Technology makes it easier to connect globally - To prepare students for jobs after college, they must be globally aware and literate.
May. 2011	Creativity & Innovation to Improve Learning and Teaching Will iPad Revolutionize Education? Technology Leadership Digital Responsibility	Standard 1 of the NETS-S is about creativity and innovation	"Issue Oriented" Anita McAnear How do you teach creativity and innovation? - Use creativity and innovation to remove barriers to learning and help all students learn how to learn? - Technology-supported strategies for helping students "Technology allows anyone to do, redo, mix, mash, publish, distribute. This empowers individuals on many levels and connects them in collaborative groups to solve problems

			and challenges" (p. 4). "The potential for positive change is enormous. A mind shift seems to be occurring as more people feel empowered and less encumbered by their fears and other barriers" (p. 4). "...empower ourselves to get creative and innovative about giving students access to digital age skills" (p. 4). "...let's stop teaching to the test and start focusing on student interests and needs. Create one authentic assignment that allows students to demonstrate their knowledge in unique ways. Let students choose their own tool for the final product, as that allows them to be creative and differentiates learning for them" (p. 4).
Aug. 2011	One-to-One Computing Online Courses for the Masses Can Assessment Technologies Make Standardized Testing Obsolete? Leadership and Management are Key to Innovative Tech Integration Cloud computing Measure the Effectiveness of your Digital Age Classrooms	Focus Forward: Visionary Leadership for Digital Age Education Learn, share, connect, and create positive change.	"Issue Oriented" Editors note: Anita McAnear Effective Leadership and Management Are Keys to Innovative Tech Integration -Leadership and management essential to schools meeting NETS standards to improve learning, teaching, and administration - Key strategies for success: district-wide focus on communication and collaboration; support for open source tech and Web 2.0; promotion of writing as a cross-curricular skills; intensive ed tech training for administrators; online and blended learning and

			funding one-to-one computing; project or challenge-based learning; focus on higher-order thinking skills. - "Digital age learning requires leadership and management that embraces modern resources, provides the tools, models their use, and enlists teachers in the effort to improve education to ensure the success of tomorrow's leaders today" (p. 4).

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